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QL FIRST FORM
Preparing for SuperBasic

RETURN OF THE ROMS

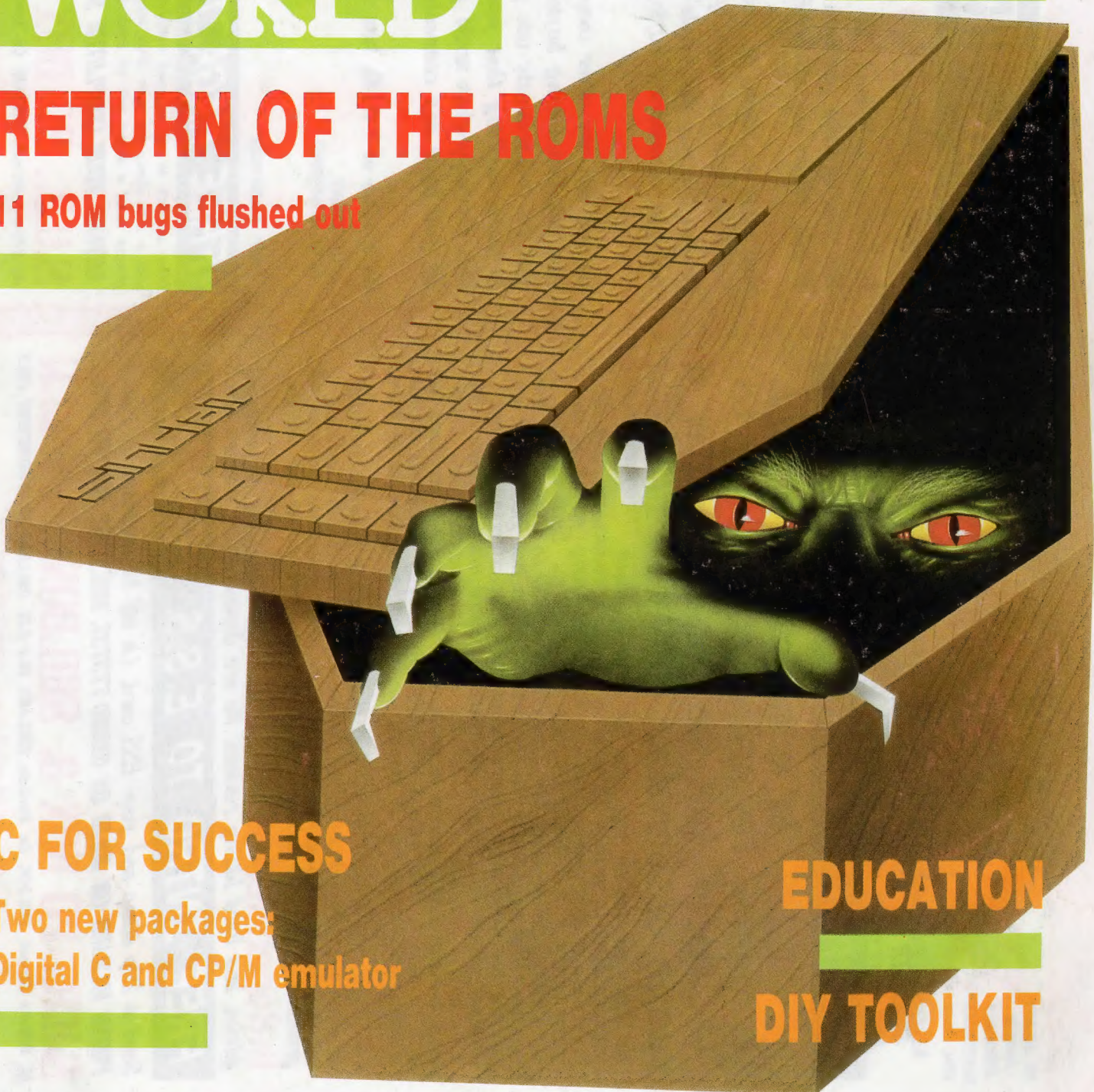
11 ROM bugs flushed out

C FOR SUCCESS

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EDUCATION

DIY TOOLKIT



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SINCLAIR QL CST "IQR" series, and all compatible machines.
NEW service for users of the ICL OPU and Merlin TONTU! Call!

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"QL S.U.B." is a magazine for ALL
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"QL World" but we can still offer a
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We don't ask you to subscribe for a year without knowing what to expect. We offer a special introductory copy for only 60p. It is a good grounding in QL computing, and it is an extra bonus if you decide to subscribe directly... Each magazine is GUARANTEED at least 40 pages. Adverts ADD to the size of the magazine. The magazine is in A5 format, and is not glossy, but we pay for our publication from subscriptions, not adverts. Why not at least glance at a copy... We usually feature news, reviews, help programs, a new adventure column, and lots more. (We think there were around 40000 words in Issue One.) Due to initial problems, we are running a little behind schedule, but nobody loses out because a subscription runs for 12 issues, or 12 months, whichever is more.)

Other benefits! Yes, there are other benefits included in your £15 subscription. Free membership of "QL S.U.B." offering a telephone helpline, written support, excellent discounts on most QL products, guarantee schemes, and lots more... Phone us for details.

Independence. We have earned our reputation on unbiased advice, and hard hitting reviews. We are dependent on readers ONLY.

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Are you, or have you been in a QL club?
If not, please explain briefly why not!

What other magazines do you regularly read?
How long have you owned your QL computer?
Do you own any peripherals? If so, which?
Are you considering buying any?

Do you own any other computers?
Are you considering buying another?

What do you presently use your QL for most?
Is there anything that you would like to do?

What service/product would you most like to have?
Do you have any comments on QL computing today?

S.U.B.
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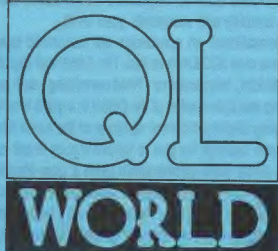
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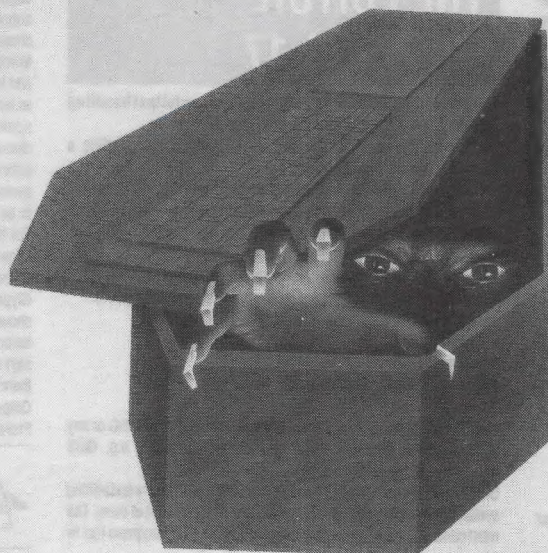
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NEXT MONTH

BACK IN BUSINESS

Leslie Fahidy launches a new series on current software and hardware the business users.

HORS D'OEUVRES FOR HARDWARE

QL First Form — common QL faults and how to troubleshoot them.

The time has come, we at DP have realised, to talk of many things: of tasks and sprites and error traps, of dataspace and strings. The (laudable) aim is to provide the readers of these pages with directions across them. After all, we don't want you to miss programs you'd benefit most from just because all the others are so fascinating. Well, then, here is a classified listing:

Operating systems and languages:

BETTER BASIC, DIGITAL C, IDIS, SUCCESS, SUPERCHARGE, SUPERFORTH, TURBO

Graphics:

DESKTOP PUBLISHER, EYE-Q, LIGHTNING, SPRITE GENERATOR, ULTRAPRINT, 3D PRECISION

Text Enhancement:

DESKTOP PUBLISHER, EYE-Q, LIGHTNING, THE EDITOR, TURBO, ULTRAPRINT

Debugging:

BETTER BASIC, PROFESSIONAL ASTROLOGER, SUPERCHARGE, SUPER MEDIA MANAGER

Toolkits:

IDIS, LIGHTNING, TRANSFER UTILITY, TURBO, 3D PRECISION

Fun (of course, the rest are fun too):

BLOCKLANDS, DROIDZONE, SUPER ARCADIA, SUPER BACKGAMMON

Leisure:

MICROBRIDGE, PROFESSIONAL ASTROLOGER, PROFESSIONAL ASTRONOMER, SUPER ASTROLOGER, SUPER BACKGAMMON, SUPER REVERSI

We'll be happy to send you, absolutely free, our Review Digest, a collection of all the independent reviews of our products that we could lay hands on, as well as a 52-page Product Brochure, which contains details of our prize draw. Don't hesitate to ask for either or both.

TURBO v2.0

The ultimate, definitive SuperBASIC compiler, used in dozens of professional programs, unbeatable for speed, conciseness, reliability, user-friendliness and bells and whistles.

Speed:

Benchmarks never tell the whole story (say the sour-grapes specialists), but the story they do tell in Turbo's case is mighty impressive.

Speedup factors (Turbo over SuperBASIC) in Personal Computer World.

Benchmarks	1	2	3	4	5	6	7	1m	1m
	34x	60x	40x	51x	40x	37x	41x	69x	22x

All this on mere default settings (FREEFORM)! Change the settings to structured on a well-written program and these values will be further enhanced. Longer programs will show much higher speed-up rates. The compilation speed is more than twice that of any pseudo-compiler and the execution speed of speed-optimised Turbo code has been shown to be at least 230% of QLiberator's (not our benchmarks, but theirs) and frequently more than ten times faster. 100x over BASIC is common.

Conciseness:

Turbo is a space-saver: compiled code is more concise than QLiberator's even without the space optimisation option, which will bring a further 40% enhancement. Compiled code is shorter than interpreted anyway.

Reliability:

The number of bugs in SuperBASIC is, alas, higher than it should be (write for our free list). Turbo gets rid of the worst of them and still manages to be fully compatible with the interpreter. Develop your programs making maximum parallel use of interpreter and compiler.

User-friendliness:

The front end has been newly-developed for maximum ease of use. If you want to optimise your program beyond what the default settings offer you, you are given control over code address size (16 or 32 bits), object code size (up to 64K or beyond), optimisation for speed or space (on a line-to-line basis if you wish), treatment of line numbers, diagnostics, display source format (freeform or structured), treatment of local strings, presence of QRAM environment, number of windows to copy from SuperBASIC, medium, filename, taskname and dataspace of the object program, buffer size, format of listing (window size and location), colours, sound, pause after errors/warnings on/off, compiler residency etc. A full Auto-corrector is incorporated, showing where the structure of a BASIC program went wrong and suggesting a correction (a faulty program might 'run' under the interpreter, but give wrong results the first time it was used, or crash on the tenth, or perform differently on occasion, or work on one interpreter version but not another).

- Both the compilation and execution of your compiled programs can be aborted at the touch of a key.
- Turbo is fully Thor, QRAM and Lightning compatible.
- Huge A4 manual including lucid tutorial and well-structured reference sections (full cross-referencing provided).
- No copy protection or royalty restrictions.

Bells and whistles:

Includes an extremely powerful toolkit with over 200 new commands (listed in Dec '87 QL World) and functions for use in your BASIC or compiled programs, or as direct commands (about half in machine code and half in compilable Super-BASIC), far beyond what is needed for compilation. Among the new features enabled by Turbo and its toolkit:

- virtual arrays (i.e. arrays of sizes exceeding QL memory)
- rubber arrays (i.e. re-dimensioning of arrays without losing data)
- integer FOR loops plus integer and string SElect structures
- Commands to prevent I/O errors caused by illegal keyboard input or microdrive/disk problems

- nine digit output accuracy
- reliable error-trapping (WHEN_ERROR)
- random binary file access
- full task control and two-way communications including pipes between tasks and sharing of variables, arrays, functions and procedures
- superfast memory search/copying/spooling
- parameter passing by value or by reference - your choice
- routine names allowed as parameters
- separate compilation of modules with superb interaction between them, permitting the building-up of routine libraries.

SUPERCHARGE SPECIAL EDITION

Supercharge was the first SuperBASIC compiler for the QL and took everyone's breath away at its launch. Ever alert to the possibilities of the QL, Digital Precision has since gone ten better with Turbo, the ultimate BASIC compiler. Now, DP proudly presents the all-new Special Edition Supercharge, with all of the features of the original Supercharge plus:

- SE Supercharge is supplied without lenslok.
- SE Supercharge has been speed-enhanced so that it now runs at a full two-thirds of Turbo's speed - 50% faster than the original Supercharge.
- SE Supercharge will allow larger programs to be compiled without modularisation on an unexpanded QL than does Turbo (on the expanded QL, Turbo wins easily) and is pleasantly discipline oriented!
- SE Supercharge is now available at the ridiculously low price of £29.95 - less than half of Supercharge's previous cost.

So if you can make do with a little less power for a lot less money, or indeed if you feel ever so slightly timid about using the extremely powerful Turbo without first test-driving a stepping-stone (we can mix our metaphors with the best of them), SE Supercharge may well fill your bill.

THE EDITOR v2.05 / v1.17

The Editor is the most comprehensive and useful text handling system for the QL and the Thor. It will deal with:

- characters (including foreign and non-printing ones, inventing a mnemonical display for the latter)
- words (you define whether you want a particular character to be a word delimiter: this can be different for word-search and word-wrap purposes)
- lines (all the usual forms of margins, tabs and justification will be found, and a few unusual ones too)
- sentences (if you want more than a single space after a full stop, the Editor will recognise and respect your wish when reforming lines)
- columns (multi-column work is supported)
- paragraphs
- screens
- blocks (character-, column-, or line-delimited)
- pages
- whole files (pure text documents, say programs in SuperBASIC or any other language, as well as text with control characters, e.g. Quill documents and pure binary files).

Of course all the commands you could possibly expect from a text editing system are present - over 200 (listed in Dec '87 QL World) of them. The most commonly used commands are available by direct keypress too. In

their extended form, they comprise an absurdly easy-to-use command language, thus permitting the construction of iterative command files (like macros, but with knobs on) for frequently used sequences - for example automatically invoked boot-up sequences for the Editor itself, or supra-commands to simplify and accelerate your work.

The Editor's speed is sensational: all operations are performed faster than by Quill, indeed some over 200 times as fast. The Editor will happily multitask with the SuperBASIC interpreter or - RAM permitting - with any executable tasks (running multiple copies of the Editor is a good idea for comparing and processing slightly different versions of the same file). There are dozens of default settings for you to ignore if your needs are simple, or else to alter either semi-permanently (with a user-friendly configurator) or ad hoc from the running program. Among these defaults are screen size and position, character size, start-up modes and margins, maximum line length, the cursor column position for horizontal scrolling to occur, the maximum number of simultaneous search strings examined AND-wise or OR-wise, etc.).

Like the Editor itself, the supplied printer driver beats all records for versatility. You can adapt it to your every need e.g. for multi-line headers and footers, for control characters to permit every font and type of emphasis your printer can handle, every paging convention etc.

Supplied with the Editor is a dedicated program that allows very easy conversion from Quill_doc format to pure ASCII (i.e. Editor format).

The Editor comes in two sizes: v1.17 for any QL and v2.05 (the Special Edition) with extra power through 80 additional commands for Thor computers and for QLs with at least 128K RAM expansion.

Each version has its own pellucidly clear and comprehensive manual, including a detailed index, and its meticulously laid out Help screens.

The rumour that the Editor's aim is to liberate you from the drudgery of composing your own texts and to do it all automatically isn't true. Editor won't do your writing for you, but by freeing your mind from the hassles associated with other text processors, it may seem to do so.

DESKTOP PUBLISHER

Desktop Publisher is a comprehensive desktop publishing system for any QL with at least 256K expansion RAM.

An even faster and more user-friendly Special Edition Desktop Publisher for QLs with at least 512K RAM and a disk drive is also available, as is an equally powerful variant for the Thor. Either will extend the power of Desktop Publisher far beyond anything available for computers well above the QL's price bracket. For a full feature list, refer to the Dec '87 issue of QL World.

SP TOP Publisher works best with Editor and Eye-Q and is supplied with a free copy of Grafix (the excellent PQOL graphic output program).

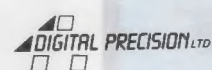
We've kept the copy short on this one - a picture's worth a thousand words (96000 bytes actually). If you want an idea of the quality that can be achieved with dtp - take a look at this ad!

PROFESSIONAL ASTROLOGER v1.5

The world's best astrology program.

Astrology is one of the subjects that tend to produce arguments which in their turn tend to produce heat rather than light. Too few people, we think, will take a scientific attitude and examine the evidence - including self-obtained evidence - for and against planetary influences on humanity. Professional Astrologer is a tremendously elaborate program (the user-adjustable text files alone cover 300K on microdrive or 450K on disk) that will give both the believer and the sceptic his due. It will, given the place and time of a person's birth, produce upto 10 A4 pages (you choose how many) of personality and character delineation, as well as 6 A4 pages of personalised day-to-day and year-to-year predictions. 3A4 pages of text are output in a comparison between two people. Translated for the cognoscenti: Interrelations for transits, progressions and synastry are supported. The program features individually adjustable orbs, eclipses, closing aspect indication and rectification. No previous knowledge of astrology is assumed, but the interested will find the concepts, methods and tenets of astrology lucidly explained (avoiding difficult words such as lenets). Professional Astrologer is based on the most accurate astronomical data of any microcomputer program (time: to one minute per century for this century; positions: sometimes bettering published ephemerides) and caters for all the major schools of astrology, 7 house systems in all. Its speed (<0.5 seconds per computation) has to be seen to be believed (but then it has been compiled with Turbo).

For those who want to test astrological predictions against what they know of some famous men and women, 158 birth data files are included in the package and await your additions. File compression is supported. Glyphs (symbols for the planets and various astrological arcana) are shown on screen and may be altered by a special configurator. When hardcopying to a printer without graphics capabilities (a daisywheel, say) text substitution will automatically be made for them. Altogether there are 16 print modes. A user configurable printer driver is supplied. Output is possible to any device or file. Batch processing is supported. Professional Astrologer is used by professional astrologers everywhere.



For more DP programs and prices > > >

LIGHTNING

The Program for Everyone

Fed up with waiting for your text to CREEP onto the screen? Tired of waiting for your program to CRUNCH those numbers? Does your coffee get cold while you are waiting for GRAPHICS to be drawn?

You need LIGHTNING, the new magic wand Digital Precision utility which not only speeds up these operations most dramatically but also gives you a host of additional features which improve the normal, day-to-day functioning of your QL. Why do we call it a magic wand? Because you, the user, need have no knowledge of LIGHTNING's workings, or of programming, or of the QL at all, to reap ALL of LIGHTNING's benefits. It is almost too good to be true. But it is true. So, plainly speaking, you do not really need to read the rest of our advertisement for LIGHTNING - the price is £29.95 (£5 off for Speedscreen owners who send us their manual, which we will mark and return) and our address is on the order coupon overleaf. LIGHTNING is available NOW.

If you have come this far you must want to know something technical about LIGHTNING: once again we stress that you do not need any of this knowledge to actually get the best from it. The power of LIGHTNING rests in its SPEED, COMPATIBILITY, and EASE of use. Once it is installed on all your cartridges or disks (a simple one-off process which we have entirely automated - there are no program lines for you to edit!) you need never worry or think about it again. LIGHTNING will then be loaded automatically each time you use your QL and will quietly but effectively ease the last ounce of speed out of the QL over the whole range of programs you use. Everything. Even if all you run are the Peison programs (heaven forbid!) LIGHTNING will be a boon! So, what will LIGHTNING do for you?

* ALL text output in the common sizes will be speeded up dramatically.

That means ALL combinations of INK and PAPER, including ALL the possible stipple colours - there are no compromises. In addition, ANY combination of UNDER or OVER will be equally enhanced. In short, ANYTHING you can print in these, the two most commonly used character sizes, will be accelerated beyond your wildest dreams. LIGHTNING fully supports UDGs and fat fonts. Further, we supply a dozen alternative fonts to the QL's built-in one: if you want to give the programs you are used to a facelift, experiment with these!

* Cursor movement, clearing, panning and scrolling of windows will all be drastically improved. This not only makes programs involving lots of text handling (eg, EDITOR and QUIL) go faster but also makes them smoother and more responsive.

* The handling of the GRAPHIC commands will be revitalised: things will now happen instantly!

* All the mathematical functions (except DEG, RAD, PI, ABS, INT, RND and RANDOMISE, which are already very fast) are greatly accelerated with no loss of precision. There is also an option to further improve speed by selecting two ADDITIONAL levels of precision - for most applications a tiny loss in accuracy is perfectly acceptable. A huge number of programs use these functions, unknown to you!

* The way QDOS handles newlines will be emulated accurately, even down to the 'quirks'. This ensures that programs will always produce the same results as when they are run without LIGHTNING. But FASTER.

* Additional features will enable you to:

a) Actively disable text output at any time WITHOUT suspending the underlying programs - this lets you "cut through the crap".

b) Simplify the testing and construction of programs using a new device called 'nul'. This can be used as a general-purpose dustbin for any unwanted output.

c) Scroll large text files to the screen at vastly increased speeds using the special `_lngZIP` scroll count command.

d) Disable certain very time-consuming operations carried out by QDOS whenever commands such as NEW, MODE or LOAD are entered. This can be beneficial in many situations. For example, when using QUIL ARCHIVE, ABACUS etc it is possible to speed up the HELP operation by avoiding unnecessary clearing and resetting of windows.

e) Individually toggle all the LIGHTNING operations on and off at will, using simple keywords, from BASIC or from within programs.

LIGHTNING has been specially designed so that you can configure it to suit your needs. Only those parts of the package that you will actually be using need be loaded at any one time. This leaves the maximum amount of memory free for your programs. Selection is fully automatic: the configuration program will invite you to answer a few relevant questions (even making sensible choices for you if you are unsure as to how to respond). It will copy all the required data to your cartridge or disk and automatically reconfigure your boot-up procedures to include the installation of LIGHTNING along with your normal startup sequence.

No RAM expansion on your QL? No problem! LIGHTNING can be used on unexpanded QLs too! Even if you have some applications requiring a lot of memory we have designed a special tiny version of the TEXT enhancement package, which occupies only 4.5K of RAM, but gives almost all of the speed improvement. You get both versions on your LIGHTNING cartridge or disk - it is up to you to choose which one to use.

LIGHTNING's graphics enhancements substantially speed up the operation of all programs that perform CIRCLE/ELLIPSE/LINE/POINT drawing. Points are plotted at over 4.5x the 'normal' speed and line/circle/ellipse plotting is typically 50% faster. FILL 1 plotting is considerably faster than QDOS (1.45x is typical) and FILLS the designated area exactly - no more patches left out!

LIGHTNING provides not one but TWO mathematical toolkits. One is designed to replace the QDOS code for LN / LOG10 / EXP / SIN / ASIN / COS / ACOS / TAN / ATAN / COT / ACOT / SQRT so that programs will benefit automatically from the enhanced speed: generally 2x (1.8x - 2.4x) without any loss of precision (ie; about 9 digits of accuracy), and about 10x by reducing precision. The other toolkit has the routines as separate functions (each is prefixed with the letter 'F'), allowing you to use them in combination with normal QDOS routines. Note that Speedscreen neither claims to achieve nor actually achieves any speedups in any of these areas.

What about my £\$%&*! program? Will LIGHTNING work with it?? Well, LIGHTNING is compatible with QRAM, TASKMASTER and all the other popular operating environments, as well as with every program we could get our hands on. Compatibility is NO problem.

Here is a comparison of printing speed. The test involves printing strings of randomly-generated characters with lengths of 1, 2, 4, 8, 16 ... 256 characters. All possible permutations of INK, PAPER, OVER and UNDER for the most common print size are used. Absurd combinations where INK=PAPER are automatically excluded to make the test perfectly fair. All the timings were carried out on the same JM QL + Sandy SuperQboard - different hardware might have a marginal effect on timings, but the relative speedups offered by LIGHTNING will be unaffected. TURBO v2.0 was used as the compiler. Comparisons were with the very latest version of Speedscreen available to us at the time of preparing this ad. All times are in seconds. The subtracted figures are the times taken to run the test when printing only zero length strings - thus they represent the test environment overhead (like the time taken by the racetrack official to press the button on his stopwatch) and should therefore be subtracted from the test times to give a true indication of speed.

Environment	Time in seconds	Speedup
BASIC	4946-1192 = 3754	0%
BASIC + SPEEDSCREEN	4722-1192 = 3530	6%
BASIC + LIGHTNING	2497-1192 = 1305	188%
COMPILED WITH TURBO	4044-270 = 3774	0%
TURBO + SPEEDSCREEN	3807-271 = 3535	7%
TURBO + LIGHTNING	1585-270 = 1315	187%

If your conclusion is that nothing speeds up your screen like LIGHTNING, you would not be wrong! "Best case" speedups for LIGHTNING are much higher, but we think it is unfair to quote them as they are unrepresentative. If we excluded all stipples, we are still very significantly faster than Speedscreen, but by a less overwhelming margin. It is our contention that Speedscreen is a good program - but, unfortunately for Speedscreen, LIGHTNING is a classic! Graphics times are based on repeated drawing of randomly selected points, lines, and circles/ellipses: we are sure that if we wasted our time looking for "best case" situations, we could show even more dramatic timings! The same test conditions apply as for the TEXT comparisons, except that we have not subtracted the test overhead - typically this was 20% of the BASIC timing for BASIC and 5% of the TURBO timing for TURBO. So the real speedup for (say) points would be $(191-20\% \times 191) : (63-20\% \times 191) = 153:25 = 6.1x$

Environment	Points	Lines	Ellipses	Filled Ellipse
BASIC	191	228	199	201
BASIC + SPEEDSCREEN	190	228	199	201
BASIC + LIGHTNING	63	153	142	134
COMPILED WITH TURBO	165	206	189	200
TURBO + SPEEDSCREEN	165	206	189	200
TURBO + LIGHTNING	39	128	128	133

The LIGHTNING manual is clear and informative, while managing to remain concise and jargon-free.

"EVERY SO OFTEN A REALLY CLASSIC PROGRAM APPEARS ON THE MARKET. LIGHTNING IS SUCH A PROGRAM. IT IS PERHAPS THE BEST PROGRAM YET TO EMERGE FROM DIGITAL PRECISION, AND THAT IS SAYING SOMETHING!"

As a special incentive to you to buy LIGHTNING NOW, we will offer you a 10% flat discount on ANY other DP software bought at the same time as LIGHTNING. THIS OFFER IS ONLY VALID UNTIL 15th JUNE 1988.

The program that puts go-faster stripes on your QL - automatically

PROFESSIONAL ASTRONOMER

The program they wouldn't let us sell in the USSR.

Astronomy being perhaps the least disputed science of them all, it is indisputably a good idea to understand a thing or three about it. While it must be admitted that few astronomical experiments can be performed to illustrate and enliven lessons, voyages can at least be simulated in a high-tech planetarium, or indeed on a high-tech QL.

Professional Astronomer will give you all data on the sun, moon and planets of our solar system in both numerical and graphic form (full sky display) for any moment in history. You may specify any one of five astronomical coordinate systems. The solar system is also shown in parallel projection with zoom, lull, freeze, auto-increment and other features. The Moon, Mercury, Venus and Mars are displayed as seen from Earth with real shadows. Eclipses are accurately computed and displayed. The automatic parallax correction feature will not be found anywhere else this side of NASA.

SUPER ASTROLOGER

For fun and more, this one is hard to beat.

This is a program which, at less than half the price of Professional Astrologer, offers well over half its power and features to the beginner or the casual user. All the essential facilities are provided.

EYE-Q V2.1

The definitive QL/Thor graphics/CAD system.

Composing a graphics screen has never been easier. The sheer wealth of features of this package is overpowering, as is its user-friendliness (it is fully driven by pop-up menus, permits single-key entry and comes equipped with on-screen help). Small wonder that most commercial screens and programs using graphics on the QL have been produced with the help of Eye-Q.

Eye-Q supports windowing, paint/fill, rubber bands, freehand movement, lines, arcs, circles, ellipses, text inclusion (any size, three text modes plus toggle-off), proportional movement, horizontal and vertical stretch, reflection, inversion, transfer, pasting, localised recoloring, magnification, reduction, localised panning, scrolling and zooming. In Eye-Q anything you do to the whole screen can be done to any part of it. A variable-width cursor is provided (with an option to select OR or XOR mode), as is a four-colour airbrush. A paintbox simplifies the selection of colours and styles. Replicable sprites are catered for. There is an hierarchical undo facility. Numerous features simplify output to file or printer: graphic screen compression, offset display, localised save and load, monochrome save, 2 fonts and a font design facility, a fully configurable printer driver (proportionality, graphic mode, density etc.) supporting several hundred printers. Ultraprint, an optional add-on to Eye-Q, offers so much luxury in the production of hardcopy that you'll feel positively decadent.

Eye-Q comprises many other configurable defaults. Resolution may be freely switched by the user. Graphics oriented SuperBASIC extensions and two demonstration screens appealing to the eye (and perhaps to the Q, if not to the libido) are included.

Eye-Q is fully compatible with Desktop Publisher, Supercharge, Super Sprite Generator v4.0 and Turbo. It will happily interface with joysticks and the Gigamouse. Eye-Q will handle anything from the starkness of a PCB to the beauty of the human form.

If your artwork still doesn't make it into the Tale, we suggest that maybe somebody there is biased against you - Eye-Q can't possibly be blamed.

SUPER SPRITE GENERATOR V4.0

The definitive developer's tool for movement-oriented games and utilities on the QL.

Super Sprite Generator permits upto 16 frames each with upto 256 multi-coloured sprites at individually variable speeds in upto 256 planes. Use of windows with screens 1 and 2 makes for totally flicker-free movement. Working with keywords from SuperBASIC (easily compiled with Supercharge or Turbo) or machine code (including new ones in Integer mode for extra speed), you have hundreds of special effects at your fingertips. Why not have sprites competing to play the national anthems of Blocklands and Droidzone while standing on their heads?

A demonstration program in SuperBASIC is supplied, to complement the instructions. It is an invaluable aid to mastering SSG.

ULTRAPRINT

The Screen Dump Supremo.

Does your QL talk to an Epson- or Oki-compatible printer? If the answer is yes, but... Ultraprint will make your machine incredibly more communicative. Graphic printouts (screen dumps to those who prefer words of

one syllable) may be selected from menus offering 22 different sizes and colour-to-b/w translation styles with up to five printer passes (handy for squeezing the last molecules of ink out of your printer ribbon).

Ultraprint is of course fully compatible with Eye-Q (including condensed screens and part screens) and any other graphics program. There are even two special modes which will handle printed circuit boards and produce perfect originals for subsequent reproduction.

Ultraprint is very easy to use: the A4 manual has been successfully tested on users normally intimidated by printer configuration procedures. It is blindingly fast (your printer won't know what hit it, even when Ultraprint is multitasking with some other program).

SUPER MEDIA MANAGER v1.12

Your data-loss insurance policy.

In a perfect world, every byte of your work on the QL would be stored instantly on at least two different devices and never be erased at all. Alas, the real world operates differently, partly for economic reasons, partly from user indolence, and overwhelmingly because of Murphy's law. Files that have become corrupted or lost (but not yet overwritten) on microcartridge or disk can be salvaged with Super Media Manager, a fully menu-driven device-management system that automates each operation to the limits of feasibility. A total of 350K of program code is provided, permitting every conceivable operation (including many types of viewing, editing and copying) on any medium, file or sector up to 256 cartridges/disks in all. Maximum user friendliness is provided by dozens of auxiliary utilities like text translation (e.g. conversion of LF into LF/CR v.v., changing of filenames to upper/lower case), alphabetising of filenames, directory of directories, hex conversion, three modes of string searching and full error trapping with automatic recovery. SMM checks out your hardware too.

Files can be read from any disk that will physically fit into one of your drives, even if the disk was formatted under an alien operating system such as MS-DOS, PC-DOS, or Acorn DFS. Full sector reading, editing and writing of alien disks is supported. A version of SMM for microdrives only is also available.

It is important to stress that SMM is not only for when things go wrong. It is designed to be your constant companion.

If there is any medium that Super Media Manager cannot handle, it must be the kind envisaged by Professional Astrologer.

BETTER BASIC EXPERT SYSTEM v2.0

The programming instructor.

Input: Your SuperBASIC program - or anyone else's!

Output: If your program is syntactically correct, well structured and easily comprehended by both man and machine: nothing (Better BASIC prefers not to burst into panegyrics that would make your head swell). If you haven't been good: gentle parental chiding and a list of things that were less than perfect, with explanations of what went wrong and suggestions for correction.

Better BASIC also takes a careful look at "obvious" statements in conditional branches, faults in which might not be discovered under the interpreter until first executed on the umpteenth run of your supposedly fully debugged program, when they would wreak all manner of havoc. On Better BASIC's advice you will get these statements right the first time. There can be no compromise with the laws of syntax and logic, but wherever there are options of program cosmetics, such as the number of spaces to be used for the indentation of loops and other structures, Better BASIC will obey your every wish.

Not only will each program you submit to Better BASIC come out in a perfected state, but you will also learn to write better programs in future by studying Better BASIC's analyses.

SUPERFORTH v2.0

The definitive Forth System.

FORTH, the language for superfast execution, is available from Digital Precision in an extensive version (FORTH-83 with full string handling and 68000 + QDOS compatibility). The compiler produces stand-alone executable code. What is more, the A4 manual gives a lucid introduction into the language, supported by detailed analyses of programs of some complexity. Forth is a slack-oriented, reverse polish notation engineered language with an ill-deserved reputation for idiosyncrasy; in fact as Forth builds up programs by building up a dictionary of words defined in terms of already known words, the language is exceptionally logical. Indeed, the SuperBASIC programmer obsessed with proceduralisation is almost already programming in Forth.

To top it all off, the package includes an extremely powerful compiled OTHELLO program which beat the 1983 world-champion MOI program at this fascinating logic game. The commented FORTH source code is supplied for your edification. The Othello program is available on its own in the form of Super Reversi. May the FORTH be with you.

3D PRECISION

At last, a real-time 3D Graphics/CAD/Toolkit System.

The only 3D program on any micro that offers Stereo ("Swift Translation and Elegant Rotation of Elements and Objects"). 3D also stands for "Three Divisions", because the package consists of three interacting modules: the Object Editor, the BASIC Toolkit and the Assembler Toolkit. No programming at all is required to use 3D Precision.

You can easily design any three-dimensional and multicoloured object (technical or artistic) bounded by straight lines or circles (no regularly or uniform diameter required) with 3D Precision's fully menu-driven, rubber-banding and help-screen-enhanced Object Editor, using 3D coordinates and/or being guided by the object's on-screen appearance as it develops: you may want to test different viewing angles, shifts, scale changes, mirrorings and rotations about any axis (not just x, y and z) before saving single objects or whole worlds to files.

Saved objects and worlds may be reloaded and processed under either SuperBASIC (C, too with the graphics extensions included in DP's Digital C) or assembler code, with several dozen commands/routines (comprehensively listed in March 31st Pop comp weekly, and modifiable default parameters added by the respective toolkit. There is also a separate configurator with scores of options (even as to the keys used for each Object Editor command). Screens (2D projections) can also be output to an Epson-compatible printer or to a file (perhaps for further 2D processing by Desktop Publisher or Eye-Q): Ultraprint can be used too. The package includes several demonstration programs: see a spacecraft land, an explosion taking place, and a car being driven around several blocks in a suburb (both from the driver's view and in birds-eye) and marvel at the speed achieved (it's like lightning!). The extensive, fully indexed A4 manual contains sections tailored to the respective thinking styles of end-users, BASIC programmers and assembler programmers. Has your enjoyment of the QL gone flat with the years? Add an exciting third dimension with 3D Precision.

SUCCESS

The Supreme CP/M Code Emulation System.

CP/M is an operating system written in the early seventies for 8-bit single-user microcomputers. For a while it had no serious competitor, and thus a truly immense number of excellent programs now exists for it: languages like PASCAL, COBOL and C, standard packages like dBase, Wordstar, SuperCalc, and thousands of public-domain games; the list is endless. Even MS-DOS does not have as wide a program repertoire. Normally a program written under a given operating system will not run on a computer which does not support that O/S: the multitasking 32/8-bit QL is not really built to do this kind of thing for CP/M. Nevertheless, Digital Precision has constructed an Emulator, that is a program which will fool the QL into believing that it is a Z80-based machine and thus run any CP/M program. SUCCESS requires at least one disk drive, because your CP/M programs will come on disk. (The SUCCESS manual contains a contact address for obtaining a host of public-domain titles).

The problem with some emulators is that they require too much overhead to maintain the original program's processing speed. Who would want a Wordstar slower than Quill, or a dBase that can barely manage 22% of Archive's pace? SUCCESS, written entirely in machine code, has brilliantly overcome these limitations, thus simulating a Z80 running at 2.0MHz! Nor is there even the slightest incompatibility or restriction: everything that runs under CP/M will run SUCCESSfully. SUCCESS comprises the three standard parts of a CP/M system: BIOS (complete hardware interfacing), BDOS (file handling) and CCP (user communication). BIOS supports microdrives, disk drives, ramdisks (7 drives in all), screen/console and printer ports and two user-definable devices. A drive configurator ensures maximum flexibility.

The DEFINE utility included in the package need be used only once for each disk to transfer its contents to QDOS. There is also a facility for copying single files. Thereafter you can run any of the programs simply by running SUCCESS. You can then edit them with THE EDITOR, or otherwise access them as if they were QDOS files. Users who do not wish to modify or write any CP/M software need go no further, but many other features are available to the experienced CP/M user. The detailed and comprehensively indexed manual is an invaluable aid both to beginners who wish to explore some of CP/M's more elegant features (eg. .COM files, STAT, ED, PIP, holkeys, 8080 assembler, dynamic CP/M debugging and some sexy utilities) and to old hands who want to know what enhancements to standard CP/M the package has to offer. Nothing succeeds like SUCCESS - expand your QL's horizon with thousands of the world's favourite programs.

IDIS INTELLIGENT DISASSEMBLER

A high-speed multitasking intelligent disassembler to complement the finest Monitors available for the QL.

Unlike ordinary disassemblers, IDIS automatically labels and automatically discriminates between instructions and data. IDIS also provides for selective/modular disassembly. Chuck out your old disassembler!

DIGITAL C

Digital C is the fastest QL C compiler (measured either by compile speed or execution speed of compiled task).

C has become the preferred language of many software developers because its compiled programs offer a speed as close to that of machine code as makes no difference. Further, C source programs are well-structured and easy to overview. No other language can hold a candle to the conciseness of C's portable code. For those who know SuperBASIC, learning C is a doddle.

Digital C's quality may be surmised from the fact that it was itself written in Digital C. In order to be fast in both compilation and execution as well as user-friendly (including QDOS compatibility), Digital C forgoes a full Kernigan and Ritchie implementation with all its daunting complexities but considerably exceeds the popular Small-C specification: additions include a library of floating-point routines as well as a QDOS library offering many I/O routines dear to the SuperBASIC programmer but not normally available in C (screen modes, windowing, graphics, sound, keyboard-handling, device-independence etc., usually with the same keyword as in SuperBASIC). 16-bit integers are processed at fantastic speed, and arrays (both numeric and string), pointers, external and global identifiers, macros and conditional compilation are supported. Digital C needs neither extra hardware nor stacks of microdrives. A language that produces marvellously compact code should itself come in compact form, shouldn't it?

The Digital C compiler comprises two tasks, a parser and a code-generator, to do the work assigned to three units in other C compilers. Meticulous optimisation for the QL has resulted in phenomenal speed: a typical symbolic code file processed in 1 hour by the Metacomp program and in 12 minutes by Hisoft's will take no more than 45 seconds on Digital C's code generator. Its compiled code is not only fast and fully multitasking but also highly efficient: a library manager program included in the package permits separate compilation of bug-free functions into one or more modules. When a subsequent program calls these modules, only the functions actually needed will be selected, thus doing away with a lot of run-time overhead.

Digital C programs will typically run a hundred times faster than similar programs under the SuperBASIC interpreter. Much of the time, Digital C is faster (albeit marginally) than even Turbo.

To write C source code you will need to use an editor. Quill will do, but for those among you who value their time, Editor (either version) is ideal. Digital C comes with a lucid manual, comprising a tutorial section for beginners (including those who know no C at all) and an indexed reference section for tyros and experts alike. Whether C is already your favourite language or whether you are interested in why professional programmers prefer it, Digital C will not disappoint.

MICROBRIDGE

Microbridge is the most entertaining and educational bridge program - ever.

Nearly every bridge player we've met has told us he wished he were better at it, and most particularly so at bidding. Of course there are plenty of books that attempt to cure this deficiency, but they all suffer from the lack of a really comprehensive storehouse of commented sample hands to give the learner as much practice at bidding and play as he needs. Obviously we at Digital Precision had to remedy this: our answer is Microbridge, a program for learning and enjoying contract bridge bidding as well as for playing practice on any expanded QL or Thor. The database (for which closely reasoned comments are available to the user) comprises several million randomly-generated but reconstructible deals. The bidding system used is standard Acol including the Blackwood, Stayman and either Weak or Strong No-Trump conventions (you can select which one). No previous knowledge of any convention is required, all relevant terms being explained in the manual, which also contains the text of the lessons. Microbridge has been highly recommended by bridge practitioners and by the Times Higher Educational Supplement. Only a very elementary knowledge of bridge is assumed. Microbridge has 16 graded lessons set out with great clarity in the manual and complemented by selected sample hands in lesson files. Each hand is dealt alarmingly fast, and you are asked to make a bid whenever it is your turn. As a hint, you are given the 'picture', ie. the upper and lower limits of the various point counts of your hand, as well as what the bidding has revealed about your partner's hand.

The bid you make may fall in any of four categories: if it is illegal you will be tersely informed of this fact. If it is outrageous or plainly wrong under Acol, Microbridge will not let you go on until you have revised it (or overridden the program; in that case you have only yourself to blame for what happens in subsequent play). If your bid is acceptable but sub-optimal, Microbridge will accept it but observe that another bid would be better. If it is the optimum bid under the circumstances (or one of several such), Microbridge will tell you so and continue. Your opponents will pass, and the computer will make the bid for your partner. This continues until a contract is reached. At every stage you may ask for a detailed analysis of the reasons leading to, and the conclusions to be drawn from, each bid. No other computer bridge program comes anywhere as close to simulating and explaining the thought processes of an experienced bridge player.

The bidding of the hand may then be repeated, with a chance for modifications, or you may move on to playing the hand (always as

declarer, since you won't learn all that much from being dummy) or to the next bidding example in the lesson.

After the hands selected by Microbridge for any lesson have been used up, or whenever you feel like a practice session, you may choose as many further sample hands as you like. You can either be North all the time or alternate between North and South, you may specify random or better-than-average hands (for training in slam bidding, for instance) and you may intervene on your partner's behalf or let the QL bid his hand.

The playing phase is where you must expiate whatever bidding mistakes you may have made. No more help is available at this stage, and the computer will play opponents' hands to the best of its considerable ability. It will draw every logical inference from the bidding and from previous play, but it will never cheat by 'looking' at unseen hands, let alone by exchanging cards between opponents to defeat your finesse. Every contract fulfilled by you will thus be to your credit, and if you go down it will be in honourable defeat.

Microbridge's user-friendliness is well marked in this phase. You select the card to be played by two keypresses, one for the suit and one for the denomination; but a single keypress will do in situations where there is no ambiguity, say when following suit. You may also use the up or down arrow to select the highest or lowest card of a suit respectively. The program will even override you on the former and skip a low card if the trick is already irrevocably the opponents'.

Microbridge gives you that rare chance of being an egotist and an altruist at the same time: while playing better bridge will be good for your self-esteem, it will also enhance your partners' and opponents' pleasure in joining you in a friendly game of contract bridge.

TRANSFER UTILITY

This Program transfers unprotected software from cartridge to disk - forever.

This utility scans your files for references to Mdv and automatically converts them to Fip. In fact, the program does much more than merely this. This utility requires a toolkit (obe present - your disk interface ROM is bound to contain Tony Tebby's.

GAMES

It is commonly agreed that DP is the number one producer of quality serious software for the QL. What isn't so well known is that our games are very hard to beat - in every sense!

SUPER BACKGAMMON

Provides reasonable playing strength and a realistic environment.

DROIDZONE

Absolutely maniacal speed. For real games freaks.

BLOCKLANDS

An addictive maze/screen arcade adventure, with a charming little man patiently working his way through 65,536 levels - all remarkably different, not randomly generated - while avoiding thousands of different types of nasties (possessed of three levels of intelligence). Our favourite.

SUPER REVERSI

If you beat this one at its highest level, let us know.

SUPER ARCADIA

Two games in one. BMX Burner is frustrating. Gridracer is for loonies!

NON-COMPARTMENTALISABLE GOODIES

* For details of hardware, please refer to our product brochure. We have special offers on ICE (£15, £25 with choice), GigaBASIC (£10) and the ABC Electronic three-channel sound interface with parallel printer port for just £40.

* **Disks for cartridges:** Send us your working new/used microcartridges and we will send you brand new blank DS/DD disks @ one 5.25" for two cartridges, one 3.5" for four. Minimum quantity 12 cartridges. Considered getting the Transfer Utility?

* **Inside QDOS:** The full 260-page, lightly-commented JS ROM Disassembly. Send us your QL serial number plus £29.95, quick.

* We are again looking for quality programs and programmers. If you have one or are one, get in touch.

* We have many new exciting programs planned for 1988. Don't ask for details, follow our ads!

Many customers ask us for advice on products from others. Here are those we feel able to recommend: CPT's Thor; Epsom's printers; Hisoft's Assembler & Monitor; Miracle's Trump Card; NEC Disk Drives; PDGL's Compare, Grafix & Archive stuff; Prosero's Fortran; Qump's Qram & Toolkit; QLiberation's Qload & Qref; Sandy's SuperBoard; Sector's Flashback & Taskmaster; Star's printers.

PRICES

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* £10 off The Editor (16) if bought with anything else
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(The really small print)

* UK prices are all-inclusive: there is nothing to add
* For orders from Europe, please add 5% p&p
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* All Digital Precision software will work with all versions of the QL and Thor, and with all disk interfaces and RAM expansions
* Each item of Digital Precision software is regularly inspected with a view to improving it and extending its application. DP has a policy of providing cheap updates at a flat rate of £10 (don't return documentation). Upgrades from one program to another are, of course, more expensive: Supercharge owners get a £20 allowance on upgrading to Turbo, DTP owners get a £20 allowance on upgrading to Special DTP, Editor owners get a £20 allowance on upgrading to Special Editor. All these upgrade prices include an exchange of program documentation.

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Adventurers discover . . . paper

QL Adventurers' Forum issue 3 is now available, with issue 4 following shortly. QLAF has noted that a forum produced entirely on Microdrive is inconvenient for users who have no printer and so from issue 4 QLAF will be printed-out instead of reproduced on Microdrive. The subscription is £4 for four issues.

QL Adventurers' Forum, C. G. H. Services, Gwm Gwen Hall, Pencaser, Dyfed, Cymru SA39 9HA.

DP disassembler deciphers the code

IDIS, the Intelligent Disassembler, is a new release from Digital Precision. Fully-compatible with the Motorola 68000 instruction set, IDIS is also singled out by DP for its fast loading and running and its ease of use for both experienced and inexperienced assembler programmers.

"Perhaps its largest benefits are to those who want only to potter about with other people's 68000

code, without first mastering all the intricacies of assembly language," says a DP representative.

Features of the program include the automatic disassembly of sub-routines called by jump instructions, such as JSR and Bcc, automatic replacement of addresses by user-friendly labels, automatic discrimination between program code and data — particularly helpful in analysing another programmer's code — and immediate reassembly of disassembled code, because IDIS produces labelled

source code instead of the usual absolute addresses.

IDIS is designed to multi-task with other programs, is compatible with *Taskmaster* and *GRAM*, and needs no memory expansion; it will even run on 128K QLs. Output to screen and peripheral devices is supported.

"Monitor program feeling lonely? IDIS is the ideal complement to all monitors and debuggers," says DP. The program costs £24.95 from Digital Precision, 222 The Avenue, London E4 9SE.



Ex-trader apprehended

Hampshire Constabulary has been in touch with *QL World* and with dozens of other interested parties to inform us that its enquiries into the business affairs of Medic Datasystems Ltd resulted in proprietor Hans Skoglund being sentenced at Southampton Crown Court to four-and-a-half years' imprisonment and disqualification under the Companies Act for 15 years on two charges of fraudulent trading. A deportation order was also recommended.

Colleague Christiina Nyholm was given a 12-month conditional discharge on both charges.

Enquiries into Medic Datasystems began in 1985 after a number of complaints were received about the non-supply of computer goods. As a result, the police made an appeal for complainants to make contact and received "more than 800 replies."

By that time Skoglund and Nyholm had moved to Ireland and applications for extradition were refused. In due course offences apparently were committed in Ireland which led to their re-appearance in the U.K. and subsequent arrest.

'Turn diseases to commodity'

QL owner Wayne Fletcher suffers from osteo-arthritis. Determined to put his time and his computer to use in a way which would help him deal with his illness, Fletcher has developed an Archive program which allows him to enter under a number of headings relating to his condition and external influences, such as diet and weather.

Information can then be exported to Easel and Quill. "It is only when the data is displayed in Easel that patterns can be detected

which can help relieve suffering," says the author. The program, he says, while not being a professional one, should be easily adaptable for medical and other problems.

The author is offering a copy of the program free, to anybody who is interested, in return for a blank formatted, named cartridge and a stamped self-addressed envelope. Modest donations for his time would be appreciated. Contact Wayne Fletcher, 8 Cooper Road, Kexborough, Darton, Barnsley, S. Yorks.

OPEN CHANNEL

Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide somebody

with the answer, or just sound off about something which bothers you, write to: Open Channel, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

Five not four

Ron Massey's article Of Mice and QLs stated that "There are at present four alternative and largely interchangeable input devices." In fact, there are five. This letter is being written on my QL using a six-button Microwriter keyboard. It is faster and, as only one hand is required, easier to use than the standard QWERTY keyboard.

I linked my Microwriter, which I have had

for about three years, to the QL this summer through a program available from Microwriter Ltd and can use it for all character work, including SuperBasic.

I look forward to doing the same thing when I buy the new Microwriter Agenda, due for market release in the early spring of 1988.

If anyone would like more information about this link, please feel free to contact me.

David Weston,
24 Howe Close,
Wheatley,
Oxford OX9 1SS.

Compress bug

The *Compress* program in the October, 1987 issue is interesting and useful but has a major bug in it for programs which have REMark statements. The effect is that when a REM statement is the first half of a concatenated pair and a working line is the second half, the working line is discarded along with the REM statement. The simplest cure is to

1415 T = T+LEN(T\$):
T#3,1,20: PRINT#
3,"Compressed "&T
and adding: A = O:T = Oat
the end of line 450. To give yourself a fighting chance of seeing the final result before it is whisked away, CLS#3 at the beginning of line 750 should be changed to AT#3,O,O.

A measure of the effectiveness of the compression can be judged from an experiment carried-out on the *Multiboot* program in the August, 1987 issue of *QL World* and has 2,353 bytes in the original. The result is:

	Compress	Shorten
Re-number	1174	1183
Same number	1219	1237
Kill	1111	1102

Editor's notebook

Readers of *QL World* often write with thoughtful and considered views on software or hardware which they have been using with greater or lesser success. These views are based on much experience, sweet or bitter, and there is not always room to print a representative sample in Open Channel.

In future, if readers put their experiences and opinions of new or older products into the form of a reasonably complete review and send it to *QL World*, we will find space to print a selection every so often. This will help reinforce the grapevine of experience gained from using the QL in the field. I will happily accept alternative reviews of the same product, if they are interesting. *QL World* will pay for reviews published at the usual rate, and the only absolute request we must take is that all submissions should be typed or printed and double spaced.

If you want further hints on approach and presentation, drop me a line and I will send some notes.

include the REMark command in the exclusion list of the "concat" function.

To do this it is necessary first to obtain some elbow room by using RENUM. Then add the line 1555 IF "REMark" INSTR T\$:RETURN O.

While the listing is in the re-numbered state, the program can be enhanced considerably by adding a tally of the raw and compressed bytes to see how well the compression is working. This can be achieved by adding lines as follows:

1015 A = A + LEN(T\$):
AT#3,1,1: PRITONT#
3,"Raw "&A

I suspect that most of the gain is from the removal of the REMark statements but nevertheless this does not diminish the usefulness of the program.

Finally, two other improvements; adding CLS: before CLS#: in line 770 sorts out an anomaly on screen clearing when re-using the program and adding &"-cp" at the end of line 260 gives an extension to a saved compressed program to identify it separately from the original.

Peter Tyler,
Ormskirk,
Lancs.

Address change

I enjoyed Michael Wheeler's *Character Writer* program in Progs, December 1987, although I had to amend the program to make it work on my QL. The reason is that the address used to get the position of the character font table in line 1020 — peek(167722) — is not constant; it moves around as you open and close channel, execute and kill jobs. The following additions should make the program work on all QL configurations under all circumstances:

- 1) Add line 155:
155 init
- 2) Add the following initialisation procedure:

```
500 DEFine PROCedure
    init
510 REMark initialise
    pointer to character
    font table, etc.
520 e = PEEK—L(163840 + 12C
    : REMark Base of
    channel table
530 e = PEEK—L(e + 1*4);
    REMark Channel #1
    Definition block
540 font = PEEK—L(e + 42)
    REMark Font table 1
    address
550 first = PEEK(font);
    REMark ASCII code of
    first char in font
560 END DEFine
570 :
```

- 3) Change line 1020:
1020 e = font + 1 + (CODE(a\$) - st)*9

Anyone who had problems with this program should find it now works. These modifications specifically use the font for channel #1. If you have different fonts in different channels, change line 530 to read:

```
530 e = PEEK—:(e + n*4)
Where n is the number of
the screen channel with the
font you wish to use.
```

**P. Clews,
Torremolinos,
Spain.**

Right key

I found your article on the Sandy and Schon keyboards in the January issue very interesting. After

reading it I decided that the time had arrived to buy a new keyboard. I decided that the Schon provided the neater solution because of the replacement top, although I was a little worried about your criticism of the size of the finer contact points on certain keys.

When my keyboard arrived I was delighted to find that Schon had answered your criticism and had replaced the problem keys mentioned. Once fitted, the keyboard is a joy to use and I give Schon 10 out of 10 for this superb keyboard.

**Anthony Hill,
Chatham.**

Easy access

When I read Colin Holland's letter concerning the redefining of LIST, AUTO and EDIT to prevent people accessing Basic programs I could not help but feel that his solution was a little too easy. I was always under the impression that the interpreter went to the ROM areas first to find what any given command meant and would look for RAM resident procedures only if it could not find anything in ROM. I was therefore not surprised when his program did not work on my JM.

My point is that even if the redefining worked it is still not sufficient to prevent people accessing Basic programs. This is due to a feature of the QL not mentioned in the handbook; no keywords are needed to access a Basic program. To prove this, type:

```
100 REMark line one
110 REMark line two
120 REMark line three
130 REMark line four.
```

Now clear the screen, press the 9 key and then press the down cursor key. The first line of the program will appear in the edit screen. Press the down cursor key again and the second line appear. By now the program will also be listed on the main screen. Pressing

the key again will bring up the third line and this will happen to the end of the program, permitting you to alter any line as you proceed. The sequence can be terminated at any stage by ENTER which will effect any changes made to that line, or CTRL/SPACE, which will cancel any changes to that line.

Having terminated, now press 999 and then the up cursor key. The program will be accessed from the tail end and can edit as before. In fact, once you are in the program you can go in any direction at will. Another variation is that if you know you want to access a program at, say, line 500, press 499 and then the down key and you are at line 500.

The foregoing editing method can be used in conjunction with EDIT. With out little test program try EDIT 100 (ENTER). When it appears in the edit screen, press the down cursor key. You will now step through the program as before but not be increment-dependant.

It is not worth redefining LIST, since any Basic program can be accessed without the use of keywords and also there is an alternative to the EDIT command which extends the versatility of the QL.

**Terry Welsh,
Benbecula,
Outer Hebrides.**

TV lined up

Having spent several hours entering *Qwhist* I was disappointed to discover that it was unsuitable for use with my television set. It was not possible to see the numeric value of ones extreme left-hand card, which I found was partially obscured by the left-hand side of the screen. This is not a problem with a monitor which gives a wider screen image. It was also not possible to see the numeric value of any card played by West. I do not know whether this problem occurs with all television sets but found it

to be present on both of mine.

I have managed to make a few line amendments which solve the problem:

```
250 OPEN # 22,scr—
    37x50a110x103
260 OPEN # 24,scr—
    37x50a365x103
410 WINDOW #
    22,37,50,110,103
420 WINDOW #
    24,37,50,365,103
1170 c% = (chan%*4.73)
    *38 + 10
4240 = 22:xpos% = 118:
    ypos% = 113
4260 = 24:xpos% = 373:
    ypos% = 113
4730 xpos% = (chan%*4.73)*38
    + 18:ypos% = 214
```

To achieve the desired effect, it may be necessary to experiment with values other than 4.73 in lines 1170 and 4730. I have not attempted to alter the position of the moving arrow selector: with the program altered as above this appears directly above the numeric value of the indicated card and does not look out of place.

I hope this information is of use to other readers who do not have access to a computer monitor.

I have experienced similar problems with other programs and would urge software writers to give consideration to this matter when writing programs for the QL.

**Bob Gibbs,
Erith,
Kent.**

TK — OK

I have recently had dealing with TK Computerware of Ashford, Kent. It has impressed me greatly. I bought an upgrade of some software which evolved to be less of an upgrade than I expected. When I telephoned with a view to exchanging for a similarly priced article the response was favourable.

Like many others, I am fast enough to criticise poor service so would be grateful if you publish my appreciation of this company.

**David Dodd,
Swanley,
Kent.**

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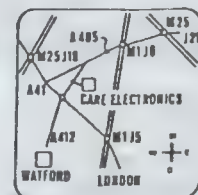
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QL FIRST FORM

In the last of the series, Mike Lloyd takes six steps to programming.

A basic understanding of how to set up the QL and load a Microdrive should be all that is needed to use the QL for commercial computer games and business programs. QL owners may be surprised to learn that very little more knowledge is needed for them to write their own programs in SuperBasic for the QL. This article aims to prepare readers for the lengthy journey through the User Guide and also help them understand the programs published in *Sinclair QL World*.

SuperBasic is a language like English but much simpler. English has hundreds of thousands of words and complicated rules about punctuation, tenses, syntax and so on. Computers cannot understand English because they lack the memory and the intelligence to remember all the words and make sense of sentence structures. Programmers therefore need to make allowances for computers by using a specially-designed, simple and precise language like SuperBasic.

SuperBasic has a vocabulary of around 200 words,

called *keywords*, each with an exact meaning. Most of the keywords prompt the computer to carry-out some operation; they are called *procedures*. Procedure keywords are often followed by *parameters* which give the QL information about how the process is to be carried-out.

A parameter can either be a *literal* or a *variable*. A literal is a real value, such as 76 or 253.74, or a string of characters in quotation marks such as "this is a string of text". The keyword *PRINT* can be used to print items on to the screen with commands such as *PRINT 76*, *PRINT "Hello"*, and *PRINT 25 + 17*. The true power of computers lies in the way in which data can be stored and to which it can be referred to.

The QL memory is made up of a huge number of small locations called bytes which can each hold a value between zero and 255. Every byte is numbered so that it can be located, or *addressed*. To save the programmer having to remember where in the memory information has been stored, the computer divides some of its memory into compartments, each holding one piece of information, and

labels each compartment with a name chosen by the programmer.

The contents of a compartment are then referred to by the label. For example, *LET X = 25* is a command which creates a compartment labelled X and stores the value 25 in it. *PRINT X* prints on to the screen the value stored in compartment X.

Labels are more properly called *variable names* and the contents of memory compartments are called *variable values*, or more simply *variables*. Once created, any value can be stored in a compartment. For example, *LET X = X - 5* and *LET X = X + X* first reduces the stored value from 25 to 20 and then doubles it to 40.

By clever mathematics, all numeric values are stored in exactly five bytes but text strings vary in length and they need a single byte of memory space to store each character. To warn the computer that text is being stored, programmers end the variable name with a dollar sign. *VALUE\$* thus refers to a string variable and *VALUE* refers to a number.

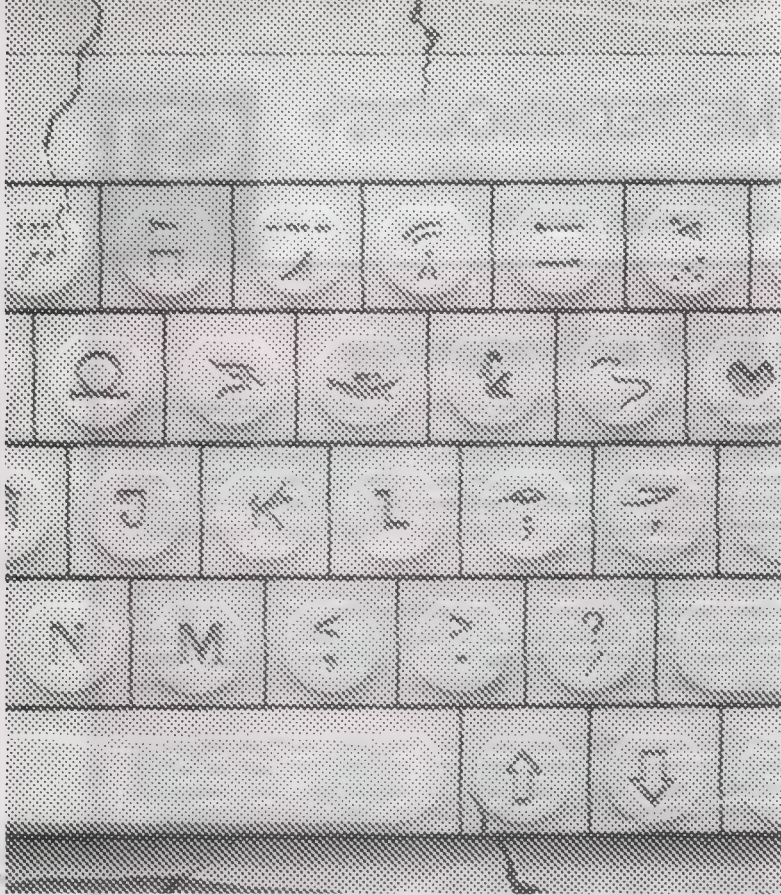
A *statement* is formed by a keyword, either on its own or followed by values or variables. Statements are the

SuperBasic equivalent of sentences and they must be constructed in precisely the way the computer expects if they are to be understood and carried-out. The way in which a statement should be formed is referred to as its *syntax* and faulty syntax causes many programming errors. A frustrating thing about computers is that they always do what they are told to do rather than what you intended.

Statements can either be carried-out directly or they can be stored to form a *program*. Programs contain lines of one or more statements and each line begins with a *line number*, any positive whole number below 32767. Line numbers distinguish direct commands from program commands and also dictate the order in which the statements are carried-out.

In the flow

The simplest program flow starts at the first statement of the first line and continues until the last statement on the last line is carried-out. This linear flow can be broken either by repeating groups of lines many times or by jumping to a distant part of the program instead of to the next line. SuperBasic includes a



and *SELECT ON* structures. The correct way of using these keywords is demonstrated in the User Guide.

120 PRINT text
130 CSIZE 0,0
140 END DEFine banner

The last feature of SuperBasic is to be considered here is the *function*. Functions are keywords which are followed by a set of brackets in which there is usually at least one value. The brackets help to distinguish functions from procedures. Functions calculate values. For example, *SQRT* is a function to calculate the square root of a number: PRINT SQRT(16) will print the value 4 on the screen.

The first line tells the QL that what follows is the definition of a procedure called "banner", a new keyword which is followed by a single parameter referred to here as *text*. The following line selects the largest character size. The text is then printed and the character size returned to normal. The final line indicates that the definition is complete.

Once this code has been entered, commands such as *banner "Hello there"* or *banner 250 + result* can be used either in a program or as direct commands. This temporary addition to SuperBasic is destroyed when the program is removed.

Unlike most other Basic dialects, SuperBasic allows programmers to define their own functions and procedures. This is rather like being able to add new keywords to the language. Suppose a programmer wished that SuperBasic had a command called *banner* which printed large text on the screen. It might be defined as:

This article has covered the six fundamentals of programming — keywords, parameters, variables, procedures, functions and programs. The next step is to learn the keywords and syntax of SuperBasic and to practise at the keyboard.

100 DEFine PROCEDURE
banner (text)
110 CSIZE 3,1

number of *control structures* which affect program flow; loops can be programmed using *REpeat...UNTIL* or *FOR...NEXT* constructs and jumps can be programmed with *GOTO* and *GOSUB* commands. Decisions can be incorporated into programs using *IF...THEN* statements

Polish your Boots

Many non-programming QL owners shy from adapting boot programs to suit their needs but the task is relatively easy if the principles are understood. There are three types of program — SuperBasic, machine code and executable. SuperBasic programs can be loaded and run with the SuperBasic keyword *LRUN* followed by a filename to tell the computer where to look for the program. A SuperBasic program stored in a file called 'boot' will run automatically when the QL is re-set. Boot files usually activate another program on the cartridge or disc. Machine code routines require a three-stage loading process to reverse memory space, copy the program code into the memory area, and activate the program.

Although these stages must occur in this order they can be interspersed by other commands.

Memory space is reserved by the *RESPR* function. The QL needs to know how many bytes to reserve and the user must know where the reserved space is. Both objectives are achieved by a command like *LET START = RESPR(2048)*. The value in brackets after *RESPR* indicates how much space to reserve. The computer then makes the

variable *START* equal the address of the first byte in the reserved memory area.

The program is copied into the memory area by the *LBYTES* command. *LBYTES*, short for load bytes, is followed by the name of the program file and the memory address at which loading will start, for example, *LBYTES mdv2—program, START*.

The program is activated by the keyword *CALL* followed by the program start address. Usually the command resembles *CALL START* but some programmers offset the beginning of a program and the command might look like *CALL START + 12*.

Multi-tasking programs are activated by the *EXEC* keyword followed by the program filename. If the program is to run uninterrupted until it is complete, *EXEC* is replaced by *EXEC—W*, the *W* indicating that other processes must wait until the current job is complete.

It is not possible to transfer executable programs between storage media using the *COPY* command. Instead, the program file should be loaded into a reserved memory area with the *LBYTES* command and then saved with the *SEXEC* command as described in the User Guide. Many software packages include configuring routines to handle file transfers automatically.

Many at once

Boot files can be re-written so that many programs and utilities are loaded and executed at once. For non-programmers, this is best done first by obtaining listings of each program's current boot file and noting all commands containing the *RESPR*, *LBYTES*, *CALL*, *EXEC* and *EXEC—W* keywords. Watch for duplicate sets of SuperBasic extensions, such as the Digital Precision ubiquitous *mdv1—xtras* file. One copy of this program will support as many DP programs as you wish.

Your new "boot" program should start with all the *RESPR* commands. Each *RESPR* command must use an exceptional, variable name. Most programs use *START* or *BASE*, so try *BASE1*, *BASE2*, and so on. These variable names must be used in the corresponding *LBYTES* and *CALL* commands.

Next, add all the *LBYTES* commands and then the *CALL* commands. Finally, all the *EXEC* and *EXEC—W* commands should be added at the end of the program. Save a copy of the program in *mdv1—boot* and *flp1—boot*, re-set the QL and cross your fingers. Errors might be due to incompatible software or lack of memory space. If changes to the boot file do not eradicate error messages, ask your software supplier for advice.



CAMBRIDGE SYSTEMS TECHNOLOGY

24 Green Street, Stevenage, Herts SG1 3DS

Telephone: Stevenage (0438) 352150



INTRODUCING THE CST

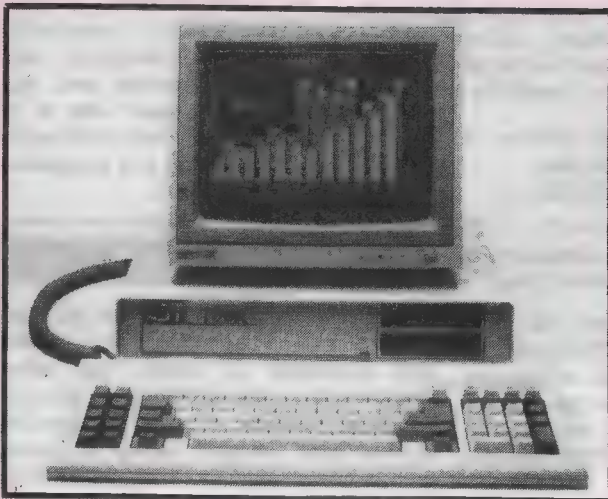
16 Bit Performance

THOR XVI

The all new CST Thor XVI is a sign of CST's commitment to developing and expanding the QL compatible marketplace and in particular the unique architecture of the operating system. Together with a full 16 bit bus implementation, David Oliver and his team have gone back to fundamentals to build into the new generation of computers a refined, streamlined Qdos compatible operating system: Argos.

While fully compatible with Qdos and the QL, the Thor XVI has enhanced networking, single key multitasking, up to 6.5 Mb of dynamic ram and all delivered at the very least at twice the speed of the QL. For the professional user there are now 20Mb and 40Mb hard discs complemented by a choice of either single or dual 3.5" floppy disc drives.

For our overseas customers (and for not a few foreign language students in the UK), the keyboard layout may be selected dynamically along with national error messages and character sets for more esoteric languages such as Greek and Russian.



BEAT THE RAM INCREASE — ORDER NOW!

Increased prices on world markets for electronic components and ram chips in particular are forcing CST to increase the price of future batches of the Thor XVI by £60. With a limited number of machines available at the old price and delivery times currently of 3 to 4 weeks, CST are still taking advanced orders at list price on a strictly first come first served basis. All orders received before June 20th will be charged at the old price.

Orders should be accompanied with cheque or credit card number in the usual way, but these will not be cashed until the goods are ready to ship (cheques will be banked 7 days before shipment to allow clearance).

The world shortage of dynamic ram chips has forced CST to revise production schedules of ram expansion modules, with initially just a 0.5Mb ram expansion card being offered allowing a total of 2Mb.

Please supply:-

	UK inc VAT	Overseas
Qdisc Interface 4 (3.5in. util. disc)	£79.95	£72.70
Qdisc Interface 4 (5.25in. util. disc)	£79.95	£72.80
QEP-III Eprom programmer (QL/THOR)	£129.95	£116.00
RAM-plus 512K QL memory	£139.95	£125.20
CST Dual 3.5in. cased floppy discs	£219.95	£200.40
CST Q-488 GPIB instrument interface	£224.25	£198.40
Qdisc 4 + dual 3.5in drives	£275.00	£249.40
Qdisc 4, RAM-plus + dual 3.5in. discs	£405.00	£363.60
QL SPEEDSCREEN 3.5 <input type="checkbox"/> 5.25 <input type="checkbox"/> mdv <input type="checkbox"/>	£20.00	£18.00

The Thor XVI Range	UK inc VAT	Overseas
Thor XVI CF (Workstation)	£690.00	£650.00
Thor XVI IF (Single Floppy)	£805.00	£750.00
Thor XVI FF (Dual Floppy)	£920.00	£850.00
Thor XVI W20F (20Mb Winchester, 1 Floppy)	£1610.00	£1450.00
Thor XVI W20FF (20Mb Winchester, 2 Floppies)	£1725.00	£1550.00
Thor XVI W40F (40Mb Winchester, 1 Floppy)	£2300.00	£2050.00
Thor XVI W40FF (40Mb Winchester, 2 Floppies)	£2415.00	£2150.00
Additional RAM for the Thor XVI Range:		
0.5Mb RAM Expansion Card	£179.40	£165.50

For the Thor Range:	UK inc VAT	Overseas
Philips Monitor (Monochrome)	£92.95	£111.40
Philips Monitor (Colour)	£295.00	£300.40
Beige Mouse	£74.75	£72.00
Pson Chess	£24.95	£22.70
INTRON I from Interlogic	£49.45	£44.00
SPEEDSCREEN rom for Thor	£29.90	£27.00
ROM installation on your Thor	£15.00	
Floppy Discs 3.5", pack of 10	£15.00	£14.00
Additional 12m Service contract (1F&F)	£100	
Additional 12m Service contract (WF)	£130	

QL Trade-in against Thor		£5.00
Deduct £70 (UK) £60 (O/S)		£10.00
Export administration		£5.00
Airmail outside Europe		£10.00

Please complete in full

Name

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Please deduct my Access/Mastercard/Eurocard/Diners Club/Vector a/c

Card No.

Expiry Date

Signature



Prices are inclusive of carriage
CST reserve the right to alter prices and specifications without prior notice



SOFTWARE LATEST:

IBM DISCS ON THOR

The arrival of the Thor XVI has caught the interest of software houses both at home and abroad and many new products are already at the beta testing stage. New versions of the Turbo toolkit and the Turbo compiler are close to completion and the new word processing package Text 87 has been ported to The Thor. A major requirement of many commercial users has now been met with IBM format read/write capability now available on Thor systems.

DiscOVER DATATRANSFER

A program from Charles T. Dillion, commissioned by PDQL and Dansoft, "DiscOVER" enables the transfer of data or program files from an alien environment to and from the Thor. This program allows reading from and writing to IBM formatted single or double density 40 or 80 track discs.

Fully supporting the subdirectory structures standard in MSDOS and PC DOS operating system the program allows the individual selection of files, directories or the whole contents of discs. The DiscOVER package also allows the same transfer of data from BBC and CPM environments.

RELATIONAL DATABASE

In a further cooperative venture Mr Dillion is also active in the parting of the top selling Raima DB-VISTA III and the associated relational database packages for both single and multiple user. The system features the SQL based query language and uses the B-tree indexing method. Amongst facilities included are multiple database access, time stamping, record locking, transaction processing and logging and restructuring.

REGREVAR

Adding to the Thor range of scientific applications software this program set named RegreVar by it's renowned author Professor J. F. Munch-Peterson, hand of the Institute of Building Design at the Danish Technical University allows the fully interactive input of experimental data and the production of variance and regression curves.

MAMMOTH MATHS TOOLKIT RELEASED

This is the first release of Dr Matt Lindros from the Chalmers Technical University, Gothenburg, Sweden and runs on both Thor and QL computers. A comprehensive work, it is called simply "The Mathematical and Graphical Toolkit" and described by Lindros modestly as "a personal selection of routines", it comes in to parts. The first is a collection of maths routines giving working examples and procedures. The second part is made up of graphics routines suitable for displaying results in conjunction with the maths routines although they can be used separately. Also provided are complete, ready to run, graphics utilities as well as additional working examples and procedures.

The novel approach adopted by Dr Lindros allows learning by example, including applications in science, engineering and economics and his 320 page manual gives detailed analysis of the theoretical foundation of every program and procedure. SuperBASIC listings are provided for insertions into existing programs. Dr Lindros's stated aim is "to show that there are many applications which do not require highly advanced mathematics".

Dear Hilde...

Dear Hilde
I've just souped up my Thor with a winchester. It really leaves the floppies standing! The speed is incredible, changing gear is smooth with the sub directories and servicing a dream with the automatic backup program. It really justifies the custom paint job I had done last year. It's a great drive, but how do I park it.

E. Z. Rhyder

THOR TIMES AGONY AUNT

Dear EZ
Don't. Your drive is clever piece of equipment, even with it's amazing speed it still finds time to store your data alphabetically to assist retrieval. At the same time all files are "date stamped" so both you and the backup program always know when your last update was made. And finally, when it's not being driven it parks, all by itself!

Hilde

THOR INSTALLED AT MINISTRY

In what is a continuing success story Dansoft have now installed Thor computers at the Danish Foreign Ministry with five more to follow and there is an installation at the Prime Minister's Office planned.

RITZAUS

The key to this success has been the advanced multitasking news handling software developed by Dansoft in conjunction with the Danish news agency, Ritzaus. The software not only lists the news items as they come in but, taking advantage of the Thor's multitasking capability, simultaneously sorts the bulletins by subject and arrival time replacing the oldest reports on disc with the latest.

GROWTH

Dansoft chief Hellmuth O. Stuvén sees plenty of room for growth. His current worry is that CST can keep up with his requirements. "There's nothing worse than having a full order book and not being able to deliver" said Stuvén in his impeccable English.

APOLOGIES TO COMMS FANS

The report on the Thor XVI's communications was squeezed out by the software news this month. Next month though it's going to be file servers and baud rates galore as the Thor XVI is put through it's paces.

Next Month: Communicating At Last!

Product: Digital C **Price:** £39.95
Product: Success **Price:** £49.95
Source: Digital Precision, 222 The
Avenue, London E4 9SE. Tel: 01-527
5493

This report is unusual in that it reviews two products which are completely dissimilar except that they are both new releases from Digital Precision. The first product, *Digital C*, is a new C compiler which has been written and optimised specifically for the QL. The second product, *Success*, is the DP CP/M emulator.

Language is what computing is about. In the final analysis, all computer languages are designed to interface the user with a computer. The only language a computer can use internally is binary; bits organised in groups of eight bits — a byte — and represented as logical ones or zeros. The bits are manipulated by the computer in a sequence of mathematical operations to execute a set of instructions embodying the program.

In the case of QL SuperBasic, text characters representing keywords are converted — tokenised — into a form which can be used in the machine by the built-in QL interpreter. The meaning of a program is defined by the way the keywords and their associated variables are put together to form a sequence of instructions.

Basic is usually the first language with which most users new to computing become familiar. Although attempts have been made to standardise Basic, one of the problems encountered immediately is the continuing development of hardware with which a language has to cope in terms of new features which successive generations of micros have available to them in areas such as graphics, sound and colour.

Slow running

All Basics are interpreted — a micro requires a program which will translate ASCII — text — characters into the binary code required by the computer. For that reason, programs running under the Basic interpreter are relatively slow.

One method used to improve the functional speed of a program is to convert Basic into another form of code which improves its efficiency, usually by bypassing the interpreter. Converting Basic in this way is done by a separate program system called a compiler which converts instructions, written in ASCII characters and according to specific conventions, into code which is more akin to the internal language requirements of a computer.

C for

C is a programming language designed to CP/M is a long-established operating software running under it. Digital C take advantage of these languages — Ron

There are three SuperBasic compilers available for the QL — the Digital Precision *Supercharge* and *Turbo* and the Liberation Software *QLiberator*. Even though significant improvements in execution speed can be obtained by compiling SuperBasic programs, other language compilers, some of which are intended for specialised applications, are even faster.

Language systems other than SuperBasic are compiled and employ a sequence of two or more stages which translate a formalised program listing, starting with text characters — the source code — through a series of processing stages — passes — to the binary code of machine code programs.

Ideally, language compilers should include a number of design considerations. They should be optimised for the machine with which they are to be used; they should be portable — that is to say source code written on one machine should be able to be compiled on other machines and the resultant program should perform in the same manner as it did on the original machine, specialised hardware requirements notwithstanding.

Because complex programs require frequent compilation and testing, compilers should be able to process the source code fast and efficiently. Languages should be compact and programmers should be able to add any number of features when and as required. This is referred to as extensibility.

Although most computer languages are flexible in that they can be used for a variety of applications, some are better for some types of programs than others. Basic is a good compromise; it is easy to learn and can be used for most types of programs. Cobol is business-orientated and would not be

used to write a graphics program.

Some languages are easier to master than others. Assembler, as one of the most demanding of all of the alternative languages, requires a high degree of familiarity with the machine for which you will be writing, in addition to a well-developed programming expertise. Generally, once you have acquired a degree of familiarity with a language system, writing machine code programs is no more difficult than writing in SuperBasic.

String handling

One of the main advantages of C as a programming language is that, unlike the majority of other languages, C has been standardised. Small-C is one of the two major implementations of C available.

Principally, Small-C does not support structures. The bad news is that you have to do things in a particular way; the good news is that you can achieve the same ends but are neither spoiled for nor potentially confused by a multitude of programming choices.

C has one principal weakness; no convention has been adopted for dealing with strings or string concatenation. Digital C, however, includes routines in its standard library for string handling.

C was developed in the Bell Telephone laboratories in the U.S. in 1972 and was based on another computer language, BCPL. The principal advantage of C is that it is very small in terms of syntax but, being very flexible, it can be extended to include as many features as required.

The same procedure for developing a program is observed for Digital C as for SuperBasic. Programming in C is very much like programming in SuperBasic but without using line numbers.

SUCCESS

produce a very compact and flexible code to strict rules; system with an extensive range of commercial and public domain compiler and Success CP/M emulator are two new programs to Massey investigates.

Initially, you write a program, using a text editor of some kind, following the structuring conventions and requirements of the system you are using. That will produce your source code listing.

Intermediate code

By way of comparison, the DP SuperBasic compiler, Turbo, uses two distinct stages to produce an executable program from SuperBasic source code. The first stage invokes parser passes one and two, producing a temporary file of intermediate code.

If no programming errors are detected during parsing, the next compilation stage, the Turbo code generator passes three and four are invoked. If no errors are encountered when pass four is completed, the program, originating from a SuperBasic listing has been converted into a fast executable program.

Digital C is designed with ease of use, portability and speed as its main criteria. Source code is produced in a text editor like the DP *The Editor*; Quill, if certain precautions detailed in the Digital C manual are observed; the Metacomco *Ed*; the ARK *The Spy* or any other type of text editor. Program structure conventions are those observed by Small-C.

Single routines

Like Turbo, compiling with Digital C is done in two distinct stages but there are two main differences. Programs compiled with Turbo can use the commands available with the *Turbo Toolkit*. If they do, the toolkit must be loaded into the QL before the compiled program is executed. Digital C, on the other hand, uses individual routines from a library module.

The Turbo parser produces a temporary scratchpad file for its object code

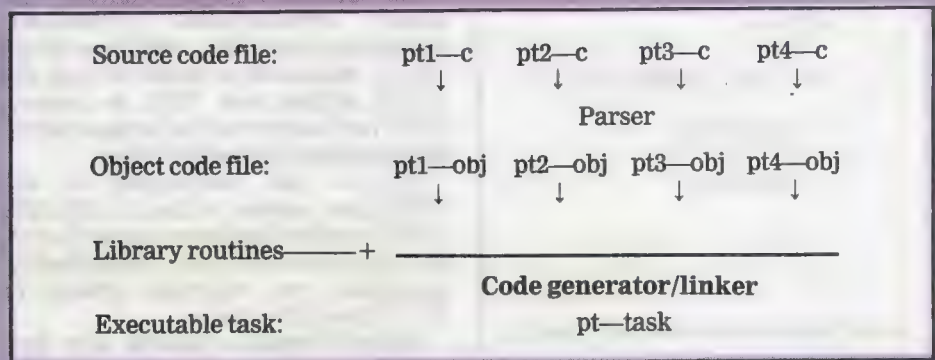
and is deleted, when Turbo is terminated, either by successful compilation or if an error is detected during passes one or two of the parser.

Digital C, while performing in a similar way, works slightly differently. Particularly useful for large programs, source code can be divided into several smaller modules. When the parser is run, each module can be tested for errors and an intermediate code file is produced for each module, saved automatically with an `—obj` filename extension.

The next stage, the code generator/

compilers which, if you are using any toolkit commands, require the entire toolkit to be available. In this respect, C programs generally require a much lower memory overhead.

An important aspect of the C library is that, if you are planning to move your program to other machines, anything contained in your program, such as window management or hardware-related requirements which are machine-specific, are handled by libraries and not by the compiler. Diagrammatically, compilation may be represented in the following way:



linker, is run. If programming errors are produced in any of the modules at this stage, you can stop, correct the offending module and run the code generator/linker again. That approach results in very fast compilation.

In addition to the `—obj` files, one or more additional files are required for the compiled program — the library routines. Library routines, either the standard library supplied with Digital C or user-developed libraries, may be considered as a form of toolkit.

When one or more libraries are linked in when the code generator is run, only those functions required by the program are used. This is a significant departure from SuperBasic

There is an element of risk in taking bench tests too literally. Generally, bench tests are indicative of performance on the machine on which the tests have been performed and can vary from one machine configuration to another.

While establishing the performance of Digital C, two programs performing the same function were devised and the following listing was run, in order, in SuperBasic; compiled with QLiberator, Turbo and the listing optimised for compiling with Turbo (see listing 1, overleaf).

The following source code, which must be compiled to run, this time with

```

100 REMark ** This listing is optimised for Turbo **

110 IMPLICIT% y,z : REMark ** Delete this line to run from
    SuperBasic **

120 INPUT "Start",q$

130 DIM a$(1000)

140 FOR y=0 TO 9

150   a$=""

160   FOR z=1 TO 1000

170     a$=a$&"x"

180   END FOR z

190 END FOR y

200 PRINT "Finish"

```

Listing 1: A short program run in several forms to establish the bench test figures below.

```

#include <stdio.h>
char a[1001];
int i, j;

main() {
puts("Start");

for (i=0; i<10; ++i) {

    a[0]=0;

    for (j=0; j<1000; ++j) {

        a[j]='x';

        a[j+1]=0;

    }

}

puts("***** Done");
}

```

Listing 2: C source code approximately the same concatenation process as the SuperBasic program in Listing 1.

reason it allows you to have, in a single suitably flexible machine, as many computers for which you have emulators.

One of the prime considerations of any emulation system is synthesising another processor in an alien environment correctly.

Having achieved a running emulator, the next goal is to improve the operation speed so that, from the user's point of view, there is little if any difference between the emulation and the emulated native environment of the operating system.

The first QL CP/M emulator, the Sandy EPROM-based *CPMulator*, reviewed in the June, 1987 issue of *QL World*, was made available during the middle of last year. With its release, users had a new world of programs and programming opened for them.

One of the weaknesses of the CPMulator system is that its *RD/CPM* utility required that you copied files on to a QL-formatted disc individually, appending the copyright symbol in front of each file name.

Digital Precision second new program release, *Success*, available as either an EPROM-based system or entirely software, includes several

M programs — which almost all are — can be guaranteed.

The emulation speed of success is about 1.0Mhz on a standard QL and if running entirely from memory; or about 1.8Mhz when on EPROM or in expansion memory.

Thor or Thor

On start-up, you will be asked if you will be running *Success* on a QL/Thor or a Thor 20. Selecting either choice will start *Success* for your machine. Seven assignments are available for QL/CP/M drives.

Respectively, A and B are assigned to flp1— and flp2—, C and D for mdv1— and mdv2—, E and F for RAM1— and RAM2— — both of which must be formatted from SuperBasic. A special assignment for drive G allows users to define their own formats for use with discs in the CP/M format.

If you wish to run a program from a CP/M disc from one of the drive formats supplied, such as Atari ST, when the prompt "A>" defaulting to flp1— appears, enter the command DEFINE ARATI-DRV. This will define drive G in the Atari format.

The parameters of several disc formats are supplied in the *Success* kit but, if you acquire a CP/M volume not included in the disc parameter list, running the *Success* ANALYSE utility will extract as much information as is possible for the new disc, creating a file automatically for the new data at the same time.

Format check

If the format of the CP/M disc is unknown, when the prompt "A>" appears, type-in ANALYSE and follow the subsequent prompts. When "A>" reappears, enter RDQDOS DISKFMT-DRV FLP1—DISKFMT—DRV. when the command has been executed, enter DEFINE DISKFMT. To set the drive default to drive G, type-in "G:".

When a disc format is unknown, the only option available is to make intelligent guesses at the answers required. Once you have obtained a sensible directory from the unknown CP/M disc, you can be reasonably sure that the drive has been defined correctly. As a measure of safety, you should observe two precautions; under no circumstances attempt to write to the disc until you have ascertained that the format is correctly defined.

Second, after obtaining a readable directory from the unknown disc, run one of the programs on it. If the program runs correctly, you will have a file containing the format parameters of the disc and can use it to re-define drive G at any time.

The disc may be in either CP/M format, which can be read from and written to directly, or from a disc

Bench Tests

Program Version	Program Size (bytes)	Running time
SuperBasic	190	330.6 sec.
QLiberator	616 + 8538 run-times	12.4 sec.
Turbo	6806	2.9 sec.
Turbo—optimised	6678	1.8 sec.
Digital C	3356	1.3 sec.

Digital C, approximates the same concatenation process as the preceding SuperBasic program (see listing 2, above).

Computer emulation is likely to be the direction most, if not all, micros will evolve in the future. If for no other

exceptional features. Perhaps the most important aspect of *Success* is that it can be described more accurately as the CP/M operating system being executed within a Z-80 emulation. For that reason, compatibility with virtually all non-hardware-specific CP/

Feature	DP Success	Sandy CPMulator
1. Terminal emulation	VT52 (1)	ADM 3A
2. Read CP/M format discs	Directly	RD/CPM utility
3. Write CP/M format discs	Directly	
4. Interchange one CP/M format to another	Directly	(2)
5. Convert CP/M format discs to QL format	x	x
6. Direct QL directory of CP/M files	x	x
7. Available in EPROM	x	x
8. Correct BIOS implementation	x	
9. Z-80 emulation	x	
10. File transfer between CP/M disc formats	x	
11. 68020-based machine compatibility	x	
12. Can be multi-tasked with Qdos	x	x
13. Declared CP/M compatibility	99%	70%

Note: 1, VT52 terminal emulation is used most commonly. Many communications systems — modems — require this standard. The CPMulator for the Atari ST also uses VT52. 2, CPMulator disc format interchange occurs in one direction only, from CP/M formatted discs to the QL format via the CPMulator *RDCPM* utility. Success can read/write to virtually any CP/M formatted disc, from CP/M to QL formatted disc and from one CP/M disc format to different CP/M disc format from within the CP/M environment.

formatted by the QL in a master directory file. This aspect of Success makes it a particularly powerful system.

One of the characteristics of CP/M is that programs expect to work with a terminal which supports special features such as cursor addressing or attributes. Success uses the VT52 terminal option available in many CP/M programs. Any of the CP/M programs which will run under the Atari ST CP/M emulator, such as *dBase II*, will run without modification from drive G on the QL, if it is defined to read Atari formatted discs.

The first version of Success received for review supported Amstrad data format and system-format discs. A subsequent finalised review copy has been provided which has changed this in favour of allowing users to be able to access double-sided CP/M discs on raw-disc drive G.

Directory tree

Converting CP/M files into QL format is done in roundabout fashion. When a disc is formatted from within Success, a large section of a disc is reserved for CP/M files in the manner of a directory tree. The master file name is always CPMfiles. Obtaining a sub-directory must be done under CP/M, using the Success DIR command.

With two CP/M emulators from which to choose, users are advised to consider their requirements before making a commitment to either. Although success and CPMulator share a number of common features, there are a number of important

differences (see the table above).

One of the most impressive features of Success is its speed of operation. CP/M programs running in the Success environment are virtually as fast as if they were running in a native CP/M machine.

In common with all programming languages, if you wish to take advantage of programming in C you will need to acquire a working familiarity with the more structured aspects of C. One of the more obvious advantages of Digital C is that it has been optimised for the QL and compiling programs with it is very fast indeed.

Perhaps not so obvious is that programs written with Digital C are portable — they can, with little if any modification, be compiled with C compilers on other machines. Digital C is upwardly-compatible with Kernighan & Ritchie compilers.

The manual accompanying Digital C, in common with the majority of language compiler manuals, does not purport to be a tutorial on the language but, having said that, it covers more than adequately the use of Digital C and will take you a long way into the intricacies and conventions of programming in C.

With regard to Success, the first question which many potential users may ask is why should they implement an emulator on the QL which, for all practical purposes is, by modern standards, somewhat dated?

As the first standardised operating system for any microprocessor, CP/M is still enormously popular and programs such as the Microsoft *Basic-80*

interpreter and compiler, the Borland *TurboPascal* and many others are still supported and upgraded periodically. Many companies still rely on CP/M-based machines for their day-to-day business operations.

There are literally tens of thousands of CP/M programs available, many of which can be obtained through numerous CP/M user groups at virtually the price of a disc.

Industry-standard programs, such as *Wordstar*, *Spellstar*, *Datastar*, *Perfect Writer*, *dBase II* and a large number of programming languages can be run on the QL, providing viable powerful alternatives to the normal range of QL programs.

Z80 emulator

Success is a particularly good emulator and simulates the Z-80 processor environment in the QL correctly. Being able to read and write to "alien" discs — from the QL viewpoint — without having to convert CP/M files into the QL format is an extremely valuable feature. That you can also read and write to dissimilar CP/M formats only enhances the usefulness of Success as a working system.

My only criticism of success as a system is that CP/M files saved on a QL-formatted disc are grouped in a master file called "CPMFILES". If you have several such discs, the only way you can acquire a directory of each disc is from within the program. A small QL utility for reading such files would be useful.

Other than that one point, Success does all that is claimed for it. It is fast, it proved to be compatible with all the many CP/M program which I had available for testing and it does its job very well.

Looking at the catalogue of other programs available from Digital Precision, it soon becomes obvious that it is company policy to provide the user with quality programs which other software houses will find it difficult to improve.

Recommended reading:

Introducing C by Boris Allan, published by Collins.

The Big Red Book of C by Kevin Sullivan, published by Sigma Press.

A User-Friendly Guide to CP/M by James T. Perry and Robert F. McJunkins, published by Reston Publishing Co.

Using CP/M by Peter Gosling, published by MacMillan.

CP/M Programmers' Encyclopedia by Bruce Brigham, published by Que.

SECTOR

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A comprehensive new desktop publishing program for the expanded Sinclair QL, written by Dilwyn Jones.

Page Designer 2 is a powerful new version of the program from the Quanta software library. Completely re-written and with a host of new facilities, it puts desktop publishing within the reach of everyone, at an affordable price. Page Designer 2 incorporates many features found on systems costing thousands of pounds. It provides full WYSIWYG, is easy to use and is supplied with a comprehensive manual. The program will run on a Thor or QL with at least 256K expansion memory and disc interface. A modular version will be made available for non-disc users.

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SOFTWARE

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REAL TIME spelling checker for Quill or The Editor V1.17 onwards on the expanded Sinclair QL.

Spell Bound is a real time spelling checker for Quill or the Editor V1.17 onwards on the expanded QL. Spellbound checks your spelling as you type with its 30,000+ word dictionary, with no discernible reduction in the operating speed of Quill. The dictionary is fully expandable to your memory/media limits.

Available on disc or Microdrive at only £29.95

SOFTWARE

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Forth	£34.00
Toolkit 2 (EPROM)	£34.00
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- **COMMAND FILE MODULE** easily creates files which will operate the machine in your absence. For example it could load quill, fill in your address, type a standard letter and print it. You will, however, have to post it yourself.
- **USER FRIENDLY** It was described as "virtually idiot proof" by a major software reviewer.

Available on disc or Microdrive and still only £25

QL SPARES

Service Manual - This is the most up to date book for repairing the QL. It contains all circuit diagrams, faultfinding charts and oscilloscope displays to enable you to repair your own QL or understand how it works.

This is not the cheap photocopy offered by some firms **£25.00**

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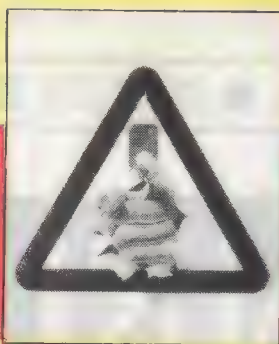
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T



ROUBLE

A P R O B L

With reference to the note in the December issue, it transpires that although six wires may be connected to the male D connector attached to your serial/parallel interface, only three wires are needed and only three are used if the interface has a PCC connector — the one which looks like a BT telephone connector. The pin connections for either the D or the PCC male connectors were as given in figure three in the December issue — 1 (ground), 3 (output from the QL), and 4 (“ready” signal from the printer). Those connections apply when Ser1 port is used; if Ser2 is used the corresponding connections are 1, 2 and 5.

Some of the connectors used on the QL and system units are not readily available or are expensive but visitors to Microfairs may have seen Highblade Ltd which offers a wide range of connectors at reasonable prices. Its range includes PCC jacks and sockets — and the equivalent D items for German QLs — for the serial ports, and QL-to-Philips, Microvitec and Ferguson monitor leads.

Although the serial port connectors look like BT telephone jacks they are not the same; you can, however, modify BT jacks to fit using a sharp knife but it is a difficult job cutting grooves in the back side to match those in the socket.

Another problem with both PCC and BT jacks is wiring them, I do not know an approved method but normally I lever out the six gold-coloured pieces of metal with a thin screwdriver, feed the wires — thin BT type, not stripped all the way into the jack — then press the metal pieces on to the wires.

Patience

How you ensure that the wires go into the correct slots only your care and patience can achieve. You can just about see the wires in the slots and they must reach the ends. The metal pieces should be inserted so that the higher edge is towards the front. The forks of the metal must penetrate the wire sheathing to make contact and they will do so only if pushed down far enough. The tops of the metal should be level with the top surface of the jack; it will not fit the socket easily if this is not so.

You may not be in the habit of using the Quill Copy or Erase commands but you are nevertheless likely to be irritated with the slow rate at which the cursor moves through the text, especially upwards. It

I Bryan Davies decides that, grumbles notwithstanding, the grass really is greener on the QL side of the hill.

becomes a particular problem when you start using the QL as a multi-tasking machine. It is surprising how slow everything becomes but the process may be gradual and not noticed at first.

One general-purpose piece of software which effects some improvement in cursor speed is *SpeedScreen* from Creative Codeworks. It has no fantastic effect on the Psion program but if you figure that any improvement is worth having it should be considered.

My checks showed cursor speed 15-25 percent greater; with *The Editor* program the figure was 70-80 percent, making it really pleasant to use on long files. It is an unfortunate but presumably inevitable by-product of adding features to a program that it begins to seem slower and that is the case when you use the new document features of Editor, but *SpeedScreen* counteracts the slowing, so that you are left at least no worse off than you were with the basic Editor, which is still much faster than quill looks like being.

So far I have tried two cures for the slowness of Quill and found that it is still far too slow for comfort with large documents and I have finally given up the struggle and standardised on Editor for all my text work, which is not to say I do not still hanker for a full WYSIWYG presentation.

Readers sometimes mention the mental agonies they go through deciding whether or not to part with a QL for something better. I wonder how aware they are of what they may be contemplating if they buy some of the more popular machines on the market. I have been trying to get to grips with an Amstrad PCW 8512 and have had a demonstration of the IBM PC/XT and have found them both decidedly poor by comparison with the QL. Undoubtedly, several years of using one machine tends



to give a bias but even so I think I would have been a very unhappy user by now if I had bought either of those machines instead of the QL.

Operating systems

The main problem area is not the hardware but the operating systems — CP/M and MS-DOS respectively — which seem to need a level of study and activity far beyond that which you have to give Qdos. To perform even basic operations, such as Copy, Erase, Format, the computers are basically dumb. You have to load the intelligence, e.g., the operating system and Basic on the PCW at least, from disc at start-up time. As examples of making the initiation into computing simple, the Psion programs stand out. Despite it having extensive menus, I find *LocoScript* on the PCW far from straightforward to learn.

There are good reasons for buying the PCW; it is cheap, works well and is supported by many suppliers. It is, however, slow in use, has discs of a size no-one else seems to want — and which are expensive — gives limited user memory space and cannot handle colour. The disc drives work satisfactorily but identical discs have to be re-formatted if moved from one drive to the other and have a capacity of 346K in one compared to 706K in the other.

They can be slower than Microdrives, too. For the price it is difficult to suggest anything in favour of the XT. As with the PCW, user memory space is not substantial and the 20MB hard disc is noisy and rather slow; subjectively, saving seemed slower with the hard disc than with 3½in. drivers on the QL and I was told that the hard disc was too slow to be used as an effective expansion of RAM memory.

Again, there is no colour or graphics

SHOOTER

E M S O L V E D

capability in the basic version. Add to this versions of the Basic language which are said to be noticeably less useful than SuperBasic and what have you? According to published figures more than one million users.

Thermal paper

Digital Precision has sent Richard Hirst a complimentary copy of The Editor program in response to his request for a way of editing out occasional spurious characters appearing in the printout from the *Professional Astrologer* program. A bug in the program seems unlikely, since so many other users have not complained but DP will investigate further to see if a change should be made. Hirst has written a SuperBasic routine to remove the spurious characters.

Gareth Boote mentioned — Open Channel, December — that he cannot obtain thermal paper for his Serial 8056 printer from Dixons. As Dixons headquarters assured me that its shops stock the paper, I suggest anyone having difficulty obtaining it contact the address and person noted. A member of Quanta, the QL User Group, has suggested using paper supplied for the Brother EP 44 or the HR5, obtainable from Boots.

Tiago Freitas in Portugal asks about transferring files between the Spectrum 3 and the QL. He can do it satisfactorily using the RS232 port but is having difficulty when trying to use the network facility. Transfer from QL to Spectrum is successful but there are errors going the other way. Can anyone give a technical explanation of why networking is not satisfactory?

K. Blundell says that his QL re-sets when he asks for a cartridge to be formatted, yet he has no difficulty using disc drives. Microdrives will load programs but Copy causes a re-set also. Unfortunately, from the point of view of tracking the fault, he has a string of add-on units, including extra memory, expansion board, disc interface and drives, *Toolkit 2*, all the modem units and a printer. It looks to be a fault on the QL PCB, perhaps central processor or ROM, but has anyone had experience of the same problem and found a solution?

M. Tuppenney has offered to supply a copy of *QL Games* programs to T. Q. Tran. He also asks if anyone can help him with the text game *Treasure Hunt* which, for him, always stops at the same point, preventing him finishing the game.

Paul Bridle is well satisfied with the assistance he has received from Zitasoft in connection with the *Sidewinder* program.

When one reads many letters of complaint or queries, one inevitably finds that a significant proportion indicate a lack of what might be called rigorous investigation of the problem on the part of the writer. I am not talking about the failure of suppliers to answer letters or calls but typically about programs which will not run. There is a tendency to blame the most recent addition to the collection for the sudden appearance of a new bug. That is unreasonable in the first instance but some people seem to look no further.

Perhaps your trusty interface has worked well for two years but that does not mean it cannot cause trouble with the new program you have just bought. You cannot apply the maxim "first come must be right", as some suppliers and users try to do. Even with something which was never specified precisely, as may be the case with QL hardware and firmware, there are basic ground rules which should be obeyed. There is also the disirability of accepting the inevitable, such as being compatible with a program or piece of hardware which has become a standard in the QL world.

One regular area of problems is the interface; most of the makes which have been on the market seem to cause little trouble, other than the well-known overheating associated with too big a load on the QL power supply, but one or two makes are mentioned in connection with apparent program problems too often for it to be coincidence.

Try it again

If you find your latest program gives trouble, I suggest you consider trying it on a machine with a different interface before starting a slanging match with a supplier. There is no excuse for failing to read and follow the instructions but nobody will blame you for that, unless you start blaming them for selling you something which does not work.

A common failing is assuming that a straight copy from the master cartridge/disc to another is all that is required to get going when it is by no means unusual for instructions to make it clear that a special back-up routine must be followed. The reason usually is that the back-up process alters files from the master before writing

them to the new medium. The copy-protection of some programs is such that even seemingly innocent attempts to do something to the master is likely to lead to it being useless. Making a minor modification to a file with an editor program and then writing it back to the master may put you out of business completely.

In general, requests for answers to readers' queries in the last year have been dealt with promptly by the suppliers concerned. There have been few letters concerning the main suppliers and we should be safe in assuming they deal with any problems without needing prompting by *QL World*. The statistics, however, show a picture which cannot be described as healthy. Attempts have been made to contact 31 suppliers; four have gone out of business, leaving dissatisfied customers and debts, and two cannot be traced, so can be assumed to have disappeared. The four are 4 **Dystems**, **Portfolio Software**, **Printerland** and **Chromagraphica**. The other two are **TDI** and **Elgen Software**.

Of more concern to QL users looking for software or hardware now is the fact that two more suppliers did not respond to requests for comment on readers' complaints — **WD Software** and **Xenon**. More recently **DS Enterprises** has become uncontactable according to several readers and one supplier; my attempts to contact DS since the May Microfair have had no success. I would advise readers who live in the London area to visit Microfairs, partly because you can get goods at reduced prices, partly because you can get the goods in your hands when you part with money and perhaps more important in the long run you get a chance to assess the suppliers by seeing the way they present their wares and talking to the principals. That is small comfort to those who live too far away to visit Microfairs; they can only talk to other QL users and benefit from their experiences.

Information

M. Loizou, asst. computer buyer,
Dixons Central Customer Service,
Seychelle House, 54-58 High Street,
Edgware, Middlesex HA8 7ED. Tel: 01-
751 4283/3931/3903.
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use with (or if you must without)

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HARDWARE

THOR: We can supply any version of the THOR now currently available — ask for our competitive prices. For upgrading the QL we strongly recommend TRUMP CARD and NEC twin disc drives — our price is £195 each or £390 the pair to include 7 per cent program/disc discount, testing and carriage.

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QL EDUCATION

QL EDUCATION

**MONTH SEVEN:
Super
Basic**

In the final article in this series, Leslie Fahidy gives some advice on selecting software for development, and the special character of SuperBasic.

One of the secrets of good programming, in the educational field as well as in all others, is to anticipate the needs and to write programs which fulfil those requirements. The task is more difficult than it sounds. Once somebody has written and marketed successfully, say a word processor, it is not too difficult to write another one — even to write one which is better than the original or at least works in a different way.

The real difficulty was tackled by the programmer who wrote the first piece of software. He had nothing to guide him, there was no industry standard word processor available to which he could compare his brainchild; all of it had to be his idea and his efforts would be judged on his ideas as much as on his programming skills.

The point which should really interest us is how we can write original software, software which is not a copy, not even an improved copy of somebody else's work, but one which succeeds because it satisfies a need. The real problem is how to recognise a genuine need and how to appreciate that our idea of a program satisfies it.

The history of computer software is full of such milestones, showing that a piece of software becomes an overnight success because it satisfies a genuine need. To quote one example, most of us with long memories will recall the days before *VisiCalc*, the original spreadsheet, appeared on the market. Try to give an honest answer to an important question in those days, when nobody had heard of spreadsheets, would you have approved the idea?

If you were managing director of a large software house and I explained to you what a spreadsheet was, would you have been willing to commit several million

pounds for development? I know that I would not have done so. Evidently, I would not have had the foresight to realise that in less than two decades no self-respecting computerate person would want to be without a spreadsheet.

How do we obtain the vision of such important and genuine software in the field of education? I am afraid there is no simple answer or at least I do not know it. There may not be a simple answer to the question but there are ways which are worth trying. I must relate second-hand

“If nobody had heard of them before, would you be willing to commit several million pounds to develop a spreadsheet?”

experiences because I have never worked on an original and genuine idea of a piece of software, certainly not one which has been successful.

The secret, if there is one, is to watch people at work, preferably people who use computers, or could be persuaded to use them, and discover all the awkward, time-consuming operations which are necessary. If repetition comes into it as well, even better. Find all those steps which are particularly prone to error, especially if such errors could be fatal for the project and then ask if a computer could undertake that task. If not, you will have to search further. On the other hand, if the answer is affirmative you would have to

investigate the likely size of the market and start programming.

In practice it is never so simple but if you were watching a computer programmer at work who uses hexadecimal arithmetic you would notice that every so often he has to find a pocket calculator — at the bottom of a pile of paperwork — and carry-out some number base conversions. What is wrong with the idea of writing a memory-resident program which will, at the press of a key, turn the computer screen into a calculator?

Food for thought

When the hexadecimal arithmetic has been finished, pressing another key will restore the screen, showing its original state. As you will probably know, somebody has already thought of this idea and a few others have copied it, as a result of which most of us have a pop-up desk-top calculator. Even though the avenue is no longer open, except for copying work, it certainly gives food for thought.

Such examples can also be found in the educational field. Watching a person struggling with learning Morse Code could give us the idea of a program which produces audible codes, reinforced by some display on the screen. The need is genuine, the program would really help; though I do not think there is a significant market for it, it might be worth a try.

The next step would be to estimate the amount of effort needed and whether it is worth it. I am not thinking purely in terms of financial returns; if I estimated that it would take 10 working hours to produce the software and if it was already available for £5.95, I do not think it would be worth the effort, not even for use by my family.

As important as the basic idea is, once we have decided on the nature of the program the next step is to plan it and then

to write it. In the course of this series I have often stressed the importance of planning before any programming is undertaken. The natural progression in the preparation of any program to obtain a skeleton idea of what the program should do; enlarge on this, to make a detailed plan, preferably on paper; work out an algorithm — a plan of action in plain English — on how to carry-out the different aspects of the task; prepare either a detailed flowchart, or pseudocode, fixing the proposed method of solution in such a way that it is easier to see the flow of logic than it is to interpret sentences written in plain English; code the program; test it, trouble-shoot it, correcting it if necessary and document the whole process.

So far I have not said much about the programming language we use, apart from the occasional reference to SuperBasic. We all have the QL manual. It has often been criticised, probably with some justification, but it gives comprehensive coverage of the Basic keywords. On the strength of that argument I should not really write about it at all.

Unfortunately, it is not comprehended easily by everybody, mainly because, unavoidably, the manual is written in technical language which may prove to be an obstacle to those who are unfamiliar with it. I will restrict my discussion of SuperBasic to those topic areas which are either of special significance in writing educational software and/or are different from their normal use in other Basics.

There can be no doubt that one of the greatest assets of the QL is the ease with which graphics displays may be programmed and displayed. This is a particularly important aspect, since a good education program must rely heavily on the use of clear and illuminating screen presentations. I use a number of other computers, some of which are considerably more expensive, and a number of languages, but I have not found one with graphics so comprehensive as they are on the QL and at the same time as easy to program.

You can draw straight lines, circles, ellipses, boxes and arcs on any part of the screen. The facility of using windows is of particular importance when writing educational software and the QL is well-endowed in this department. Since much of the success of programs in our area of interest depends so heavily on good screen presentation I would urge you to use windows whenever possible. All shapes may be filled with any desired colour, dependent on the MODE you are using at the time. Probably the most important aspect is that all the graphics commands are simple and well-documented in the manual.

Beware the mode

Even though it is not under the heading of graphics, I should warn you to be careful with the use of the 'MODE' com-

mand. You must be on your guard, particularly when writing programs to be used by others. If the end-user employs the family TV set rather than a monitor, MODE 4 is not particularly useful, especially if the screen contains a large amount of important text.

All the important structures of modern implementations of the Basic language are there, with the possible exception of the 'WHILE . . . WEND' loop. Even this may be emulated, so effectively it is available. There are some differences, however, when SuperBasic is compared to other implementations and they are in favour of the QL. The first such difference concerns the 'IF . . . THEN' structure which, of course, has the 'ELSE' clause available. The improvement is that you may split the statement after the 'THEN' into several lines. A program, section, such as the one which follows, is legitimate:

```
100 IF <condition> THEN
110 <take action number 1>
120 <take action number 2>
130 <and a>
140 <number of>
150 <other actions>
160 ENDIF
```

The bonus is that very often, particularly in more complicated cases, there are so many actions to be taken if the condition evaluates to 'TRUE' that it is difficult to fit them all on one line, even on a multi-statement line. By breaking the statements

“A deficiency of the language is no excuse for not developing well-written educational programs for the QL.”

between 'THEN' and 'ENDIF' into several lines, we may write a program section which remains intelligible.

The second difference concerns the format of the 'FOR . . . NEXT' loop. In all varieties of Basic it has always been of concern to programmers how to break out of a loop and it is often necessary to do so. We have all learned that we must not attempt to leave the loop with a 'GOTO' statement, having a destination outside the loop; it must be terminated properly. SuperBasic has solved the problem for us; the proper terminator for a 'J loop,' say, is 'END FOR J,' though 'NEXT J' will be interpreted correctly in the interest of compatibility. We may, however, break out of the loop with the instruction 'EXIT J'. This statement may also be tested with an 'IF . . . THEN,' i.e.:

IF <condition> THEN EXIT LOOP
is acceptable.

The availability of the 'REPEAT . . . END REPEAT' loop helps considerably to lift SuperBasic into the realm of highly-structured languages. The 'EXIT' statement may be used, just as in the case of the 'FOR' loop, which simplifies many control problems.

I feel that the real bonus, however, is in the presence of named procedures. At the time when the QL was first marketed, very few Basics had procedures, one notable exception being BBC Basic. These days, most good versions of Basic have procedures, acknowledging that it was a worthwhile introduction in SuperBasic. For the benefit of those who have shied from using procedures it is not very different from a subroutine; it certainly is used in the same set of circumstances.

Remember the name

We may, however, call it by a name rather than a line number. This is a significant improvement; if a program contains 20 subroutines it is not easy to remember the starting line number for each, particularly if the whole program has been re-numbered a number of times, but remembering the name of a procedure is easy. It is also possible to pass parameters to a procedure from the calling program and those parameters may be declared 'LOCAL,' thus not interfering with a variable of the same name in the main part of the program. Defined functions are also available in SuperBasic and they work largely the same way as defined functions in other variations of the language.

You may have gathered that I like the Basic language found on the QL and your observation would be correct. There is, however, one aspect of SuperBasic about which I am not entirely happy. I am probably in the minority because I have often heard and read people praising coercion in the language; there is no doubt that it helps in many situations. All the same I would prefer not to have it.

Coercion is the name given to that aspect of SuperBasic which allows us to use strings as if they were numbers. In all other versions of Basic, if a\$ contained "1" and b\$ held the number "2", the expression: a\$+b\$ would generate "12", i.e., the two strings merely concatenated — one written after the other.

In SuperBasic a\$+b\$ would yield the number 3, the values of the two string variables added. This facility may be very useful on certain occasions but I usually avoid using it since it may lead to a sloppy attitude, failing to distinguish between numeric and string variables.

The all-important statement, from our point of view, is that a deficiency of the language is no excuse for not developing well-written and suitably-structured educational programs for the QL.

Return of the ROMs

When I revealed the results of three years' research into the idiosyncracies of the QL built-in software — the operating system Qdos and the SuperBasic interpreter — I found and explained 77 bugs in the QL ROM.

Since then, with the help of *QL World* readers, I have identified another 11 problems, so now is the time for an update.

This is more than just a list of faults; it explains how to circumvent them. All complex systems contain bugs, though hardware manufacturers curiously are shy about admitting them and sorting them out. Bugs are rarely a problem if you know about them and how to avoid them. All most users want to know is how to get the result they need without getting into difficulty.

There is no sure definition of a bug. One person's bug is usually someone else's feature. I have included quirks of the QL ROM which cause apparently correct programs to give unexpected results, or no results at all, plus a few undocumented features. The list deals only with idiosyncracies inside the QL ROM — the SuperBasic language and the associated collection of operating routines called Qdos.

Some of the bugs may cause other programs to fail, so I have included technical information to help software developers guard against the most common problems by defensive programming in their own code. The bugs are in two groups — problems which afflict all QLs, followed by a list of faults specific to certain ROM versions.

'New' bugs in QLs everywhere

Integer input

Dilwyn Jones reports a sometimes annoying bug in all QL ROMs. Integers

— whole number values stored in variables with a percent sign at the end of their names — can have values between -32768 and 32767. The statement `X%=-32768` works satisfactorily but `X%=-32769` gives an error as you might expect.

You cannot INPUT a value of -32768,

If you try to do so you get an 'error in expression' report because the QL works out the value of the digits before its sorts out the sign, plus or minus, and +32768 is not a valid integer. Qdos uses the same code to convert values from all devices, so the bug is present whether your INPUT is from the key-



Simon Goodwin follows up last year's look at the QL built-in ROM software with 11 new bugs and more about the QL

Window rules

You can define the position of any window on the screen in terms of co-ordinates in picture elements or pixels. The co-ordinate scheme assumes that there are 512 pixels across the screen and 256 downwards. Window widths and horizontal co-ordinates are always rounded to an even value. This means you cannot put a one-pixel gap between two windows in MODE 4, the highest resolution QL display mode. The minimum gap is two pixels.

You cannot deal with this by setting a BORDER width of one in the window, as horizontal border widths are also rounded up, so that BORDER 1,7 gives a white border one pixel wide in the horizontal lines but two pixels wide vertically. You can easily see this if you use a stippled border pattern:

```
MODE 4 : BORDER 1,7,0
```

This bug is not properly documented but understandable when you think about the QL display design. The restriction exists because QL windows are designed to be able to cope with a change of MODE at any time. One mode allows four colours, with 512 dots across the screen, while the other allows eight colours with 256 dots on each line. A gap of one pixel in MODE 4 would become a problematic gap of half a pixel as soon as MODE 8 was selected.

Merge bugs

The MERGE and MRUN commands become confused if you use them inside a SuperBasic procedure or function because the act of merging new program lines invalidates stored information about where in the program execution should continue.

SuperToolkit 2 re-defines those commands to detect attempts to use MERGE inside a DEFinition. It stops the program with a 'not implemented' report if it runs into trouble.

Cotangent error

Dr. Helmut Aigner of Austria discovered that the Co-Tangent function, COT, gives a result of 1 when asked to find the co-tangent of zero, whereas COT(0) is undefined and should really give an 'overflow error.'

The error is in the Qdos maths package, rather than in SuperBasic, so it affects other languages. In general, if a language uses the Basic 7-9 digit

precision, it is likely it will inherit this bug. It is easy enough to check for the special case of zero explicitly in programs which use co-tangents.

Startup keys

According to published documentation about Qdos it should be possible to tell whether the user started the QL by pressing F1 or F2 by reading the value in address 163890, known as SV.TVMOD. This information would be very useful when programs start as they could work out whether or not the user had a monitor and set windows to suit automatically.

When the QL starts PEEK(163890) is 0 for a monitor display (F1) and 1 or 2 for a TV display (F20); 1 indicates a European TV, capable of displaying 256 horizontal lines of pixels, and 2 means that a 525-line American display was selected, with 192 lines of pixels and characters eight rather than 10 pixels high.

Unfortunately the MODE command, used to switch between four- and eight-colour displays, has a bug which means that the value of SV.TVMOD, the F1/F2 flag, is affected as soon as you issue your first MODE command. The result is that programs have to deduce whether you are using a TV or a monitor indirectly by checking the screen mode — four or eight colours — rather than the initial selection you made after turning on the machine. This is a fault because it does not necessarily follow that you are using a monitor because you are in MODE 4 before you start using Quill. Nor does it follow that you have a TV because you load a Psion program from MODE 8.

Current versions of the Psion package no longer check SV.TVMOD because of the bug. You can circumvent the fault when using programs which test SV.TVMOD by POKEing the required value back into 163890 but this will not help if your program loader issues a MODE command before it tests for TV or monitor selection.

This bug can be cured by re-writing the MODE command to set register D2 to -1 — meaning no change — before calling the operating system. Anyone who owns a copy of Speedscreen will find that it fixes this bug automatically by replacing the standard MODE routine with an enhanced and corrected version. If you want to use it to keep the original F1/F2 value you should load Speedscreen at the start of a session before the first MODE command.



board or a file.

It is really just sloppy coding on the part of the ROM authors who seem to have difficulty with the value -32768. I pointed out previously the weird results you can get using that value with the integer DIV and MOD operators.

CLS

By far the most interesting QL bug occurs in the CLS command. All known ROM versions accept undocumented CLS parameters and do unexpected things as a result. The CLS command allows a single optional numeric parameter. Officially it is a value between 0 and 4, referring to different sections of the display as documented in the QL User Guide.

Non-standard values cause calls to other display device routines, using whatever parameters happen to be in registers when the call takes place. Some of those routines are not normally accessible from standard SuperBasic. The property appears to be an accident, although it can be useful in practice.

The internal routines to clear different areas of the screen form a sequence of distinct system-calls — SD.CLEAR, SD.CLRTP, SD.CLRBT, SD.CLRLN and SD.CLRRT, using system call numbers 32 to 36 inclusive. CLS converts parameters between 0 and 4 into a call number of 32 to 36. So choose the appropriate ROM routine.

Other system call numbers correspond to different display operations and the code for CLS allows parameters outside the documented range of 0 to 4.

Parameters between 5 and 7 give a 'bad parameter' report but CLS changes the current STRIP colour, the background colour used when printing characters. CLS 8 works like STRIP 0! You can put a channel number before the parameter to select the window affected by the command CLS #0,8.

CLS 9 works like INK 0, which is particularly interesting when you realise that the system call to set the strip colour is number 40 and the call to set the ink is number 41. The sequence continues through the TRAP #3 display routine, so CLS 10 sets FLASH 1, CLS 11 sets UNDER 1 and CLS 12 selects OVER 0.

Values between 13 and 15 give a 'bad parameter' again, as do all parameters which give results between 5 and 7 if you make them MOD 8 but then things become really interesting. CLS 16 plots a point at graphics co-ordinate 0,0. The next three have no obvious effect but CLS 17 draws a zero-length line, while 18 and 19 draw zero length arcs and ellipses.

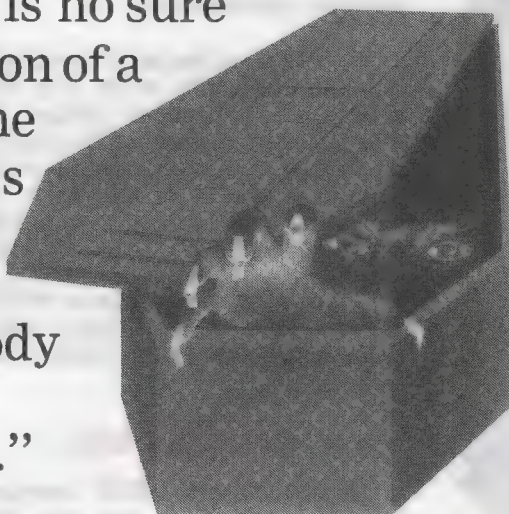
CLS 20 calls SD.SCALE, system call 52, and has the rather annoying effect

of setting an enormous graphics scale so that lines, arcs and ellipses all appear in the bottom left pixel of the window. Use SCALE 100,0,0 to set things to rights.

Parameters from 21 to 95 give 'bad parameter'. CLS 96 appears to do nothing but in fact it checks the channel for pending input, using system call zero. The parameter values have 'wrapped around' internally to start again at the lowest call numbers. CLS 97 waits for one character before returning. CLS 98 uses the INPUT routine 10.FLINE to read the character codes between 32 and 191. Characters are displayed but not returned and the buffer size is just 3.

CLS 99 calls 10.FSTRG; it fetches a line of up to three characters of any code without displaying them. ALT keystrokes count as two characters. CLS 100 calls 10.EDLIN, the Basic line editor. A long strip of gibberish

“There is no sure definition of a bug. One person's bug is often somebody else's feature.”



appears; you can edit the text but any attempt to insert characters after the second gives a 'buffer full' error.

CLS 101 to 104 give 'bad parameter' again. You should not enter CLS 105 as it locks up the machine; it corresponds to SD.EXTOP, the extended operation call, and in this case it hands over control to a non-existent routine.

CLS 106 and 107 have no obvious effect but they read the window size in pixels and characters. You get a three-pixel-wide, horizontally-striped border with CLS 108.

CLS 109 to 111 give 'bad parameter', unfortunately, so you cannot access the routines to turn the cursor on and off. CLS 112 and 113 call the POS and TAB routines, in both cases causing an

'out of range' report. CLS 114 moves to the next line unless the window could need to scroll in which case it gives an 'out of range' error. This call, to SD.NL, could be useful in screen-handling programs if you have some way to trap the error — it prevents having to keep checking the current line when moving. CLS 115 moves the cursor left, giving 'out of range' after the left most column of the window, and CLS 116 moves the cursor right.

CLS 117, 118 and 119 give 'bad parameter' but CLS 120 scrolls down the window by 10 lines; 121 and 122 scroll each side of the window, while CLS 123 pans the window right. Parameters from 124 to 127 are rejected and at CLS 128 we are back to the same effect as CLS 0. The parameter values cycle round in a 128-step sequence.

Special bugs

The remaining bugs affect only the specific versions of the QL noted. The August 1987 edition of *QL World* explained how you can upgrade the ROMs in your QL. You can obtain most QL ROM versions from Adman Services at 53 Gilpin Road, Admaston, Telford TF 5 0BG.

I said initially that JM and later versions were made using mass-produced 'mask-programmed' ROM chips, whereas the AH and earlier versions used individually-programmed EPROMs. The upgrade procedure from EPROM to ROM is significantly more complicated than from one ROM to another, when you can just swap the chips in their sockets.

Since then I have heard from D. A. Masters, who bought a JM QL with EPROMs in it. It appears that the first 100 or so JM QLs were made with EPROMs rather than ROMs because the JM software was ready but had not arrived from the manufacturing subcontractor. The upgrade procedure from JM EPROMs is the same as that for AH chips.

Second processor

I have found a cure for the CTRL-ALT-7 bug, documented last year. Most QLs lock up if you type those characters because the software in the second processor, separate from the main ROM, treats that keypress as a request to call up external hardware which only Sinclair owned.

Add-on keyboard manufacturer Schoen recently produced a replacement second processor to cure key-bounce problems for people using its keyboard and this upgrade also prevents CTRL-ALT-7 interrupting the machine. Unfortunately the Sinclair key-bounce fix, the version 1.2 chip from Applied Technology, does not correct the CTRL-ALT-7 bug.

Editing cursor

The first two workable QL versions, AH and JM, have a bug in 10.FLINE and 10.EDLIN, routines used by INPUT and EDIT. If the data entered becomes too large for the available storage buffer the routine gives an error message but leaves the cursor turned on in the input window.

This does not cause problems in the JM ROM versions of those commands because the ROM code turns off the cursor after an error to be on the safe side. It can cause problems if you write your own machine code programs and call 10.EDLIN or 10.FLINE.

You can prove that the error exists by typing CLS 98 to call 10.FLINE directly, then typing three characters to fill the buffer. An error is reported and the command cursor appears at the bottom of the screen but the cursor at the top of the screen is still flashing. Type CTRL C to get back to the command line, then enter INPUT X\$. Finally, press ENTER and let INPUT turn off the stray cursor.

The DIY Toolkit function EDLINE\$ and the Turbo Toolkit EDIT%, EDIT\$, EDITF functions all contain code to turn off the cursor explicitly so they are not affected by the bug.

Bad names

The AH and JM versions of QL SuperBasic have the annoying bug that they will not let you re-define names which have caused the computer to give a BAD NAME report. You might become irritated by the standard QL display speed and type: -SPEED 2 to turn on Speedscreen, only to find that it was not loaded. The system reports a BAD NAME error — unless you have the ROM version — because it does not recognise the command. After that normally you would use RESPR to reserve some space for the code, load it

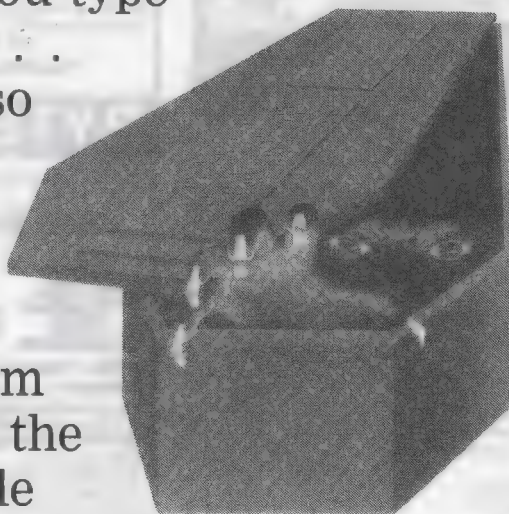
with LBYTES and call the start address.

In this case you are usually safe, because Speedscreen turns itself on automatically when you load it but the -SPEED command is still considered a 'bad name' by an old QL system. So you cannot check the Speedscreen version with -SPEED 1, because -SPEED is still defined as a Basic 'bad name' rather than the name of an extension command.

The same confusion occurs if you try to use any other Toolkit commands before loading them. If you try to use them before they are loaded you confuse the system. Such commands work properly after you type NEW, because that clears out all prior SuperBasic definitions, leaving only the resident commands and functions. Unfortunately this also gets rid of your program and all the variable values.

If you try to run a program compiled

“Toolkit commands work after you type NEW . . . this also gets rid of your program and all the variable values.”



with version 2 of Turbo on a system where commands are multiply-defined the compiled code produces a message and a list of re-defined names it needs to use. Type NEW and try again.

CLEAR is not sufficient to persuade SuperBasic to release unset names. The interpreter tends to grab memory whenever possible and release it only under extreme circumstances. Resident command definitions over-rule SuperBasic ones in JS and MG versions of the QL, so this bug does not affect later ROMs.

No cursor

Another annoying quirk of the AH

and JM ROMs is the way the cursor vanishes after you have finished using a task. Nothing appears on the screen until you type CTRL C to switch to another window.

Later QL ROMs turn on the cursor automatically in the 'next' task window — usually the SuperBasic window zero at the bottom of the screen — when the task which was previous accepting input terminates.

Translation

The JS version of the QL introduced a new command, TRA, which translates or exchanges the codes of characters transmitted through the serial ports automatically. The bad news, according to top Danish software house Dansoft, is that TRA translates values only after it has adjusted the parity of characters, so that character codes greater than 127 may not be translated.

JS ROM key

The JS ROM has another exceptional bug in its handling of the CAPS LOCK key. If you press CTRL and ESC at the same time on most QLs you get character code 128. ESC is not a letter of the alphabet so you would not expect pressing CAPS LOCK to have any effect on the code you get.

A sloppy comparison statement in the JS ROM means that CTRL ESC gives a code 160 if CAP LOCKS is in effect and code 128, as expected, otherwise. This is a very esoteric bug but it is worth noting if you are writing a program and planned to use CTRL ESC as a control keystroke. Code 160 normally is obtained by pressing CTRL SHIFT "2".

● Simon Goodwin revealed 46 other bugs specific to particular QL ROM versions in the August, 1987 issue of QL World and listed 31 bugs in all QL ROM versions in the September issue. This list brings to 88 the number of published ROM bugs. Doubtless there are more, although we must have tracked most of the important ones by now. If you have found others, please let us know.



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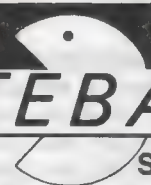
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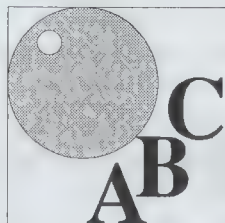
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F10	SHIFT F5
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SCROLL LOCK	CTRL F5

NUM LOCK toggles the state of the NUMLOCK LED.

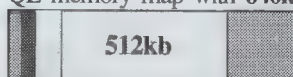
This controls the function of the numerical pad. Is NUMLOCK on, then a keypress on it generates the numbers and characters shown at the keys, otherwise

ARROW KEYS	CURSOR CONTROL
HOME	Cursor to start of line (in editors only)
END	Cursor to end of line (in editors only)
PAGE UP	UP Scroll up one page (in editors only)
PAGE DOWN	DOWN Scroll down one page (in editors only)
DEL	Delete character under cursor
INS	ALT ENTER (with SuperToolkit II)
CTRL -	program slow down
CTRL +	program speed up
SYSREQ	Job-change (function of CTRL C)
CTRL PRN	toggles MODE 4 and MODE 8
ALT SHIFT SYSREQ	Level 7 interrupt (CTRL ALT 7 at the QL)
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QLW6

DIY TOOLKIT



Each month Simon Goodwin adds new commands to the QL repertoire. This month's routine lets you rename loops, variables and devices throughout SuperBasic programs.

QL SuperBasic lets you write well-documented, readable programs. Variable and structure names can be as long and detailed as you wish. Names are stored only once and manipulated with internal index numbers, so long names do not slow programs or increase the program size as they do on less

sophisticated computers. Unfortunately many QL programmers still use very short Basic names, not because they are memorable but because they are easy to type. Once you have chosen a SuperBasic name you are usually stuck with it. Editing in Basic is laborious, because there are no global commands like search and replace, so every change has to be identified by

eye and altered by hand, with plenty of scope for mistakes.

You could SAVE your Basic and tidy it in a text editor such as *DevPac* or *The Editor* but then you run into different problems. Editing programs are general-purpose things and know nothing about SuperBasic syntax. A normal search and replace operation probably will change parts of the comments and text in the program, as well as the variable names you want it to find.

If you replace the SuperBasic name 'val' with the more descriptive 'InitialValue' using a text editor, you will probably have automated gibberish like:

```
REMark EInitialValueuate expression  
or  
PRINT "InInitialValueid entry"!
```

Another snag of using an editor is that you have to load back the SuperBasic text into the interpreter when you have finished. This is a slow process because the interpreter tokenises the file, working out the context and meaning of every character, separating names, comments and text — in fact, doing all the detective work the editor was unable to do.

Skipping overhead

What we all need is a command which will go through a tokenised SuperBasic program, replacing one name with another, skipping over comments, text, names which occur inside other names, and just changing names which exactly match what you are seeking.

That is this month's DIY Toolkit project. It is interesting because it introduces code to scan any tokenised program code which might be useful in other program-editing and monitoring applications.

The new command, REPLACE, expects two names as parameters. It goes through the current program, seeking the first name and replacing it with the second. The names must not be in quotes, as the command relies on the SuperBasic ability to convert any unquoted name into an index in a data-structure called the Name Table:

```
REPLACE VAL,InitialValue
```

As usual, it does not matter whether names are entered in capitals or lower-case. LIST and EDIT always use the same capitalisation as you did when you first entered the name, because the system stores a name only once.

You can change loops, arrays, scalar variables and unquoted device names

with REPLACE but you cannot swap routine names. This is an unfortunate consequence of the way SuperBasic parameter passing works. If you supply a function name SuperBasic passes the value, rather than the name, to REPLACE. This causes a parameter error when the code tries to find the non-existent name.

The QL syntax checker will not let you use the names of procedures as parameters. You get an 'error in expression' if you try to REPLACE procedure names throughout a program.

REPLACE risks

REPLACE manipulates your program source, so it has no useful effect in a compiled program. By the time a program is compiled all the literal names have been stripped out and converted into addresses and offsets. Despite its limitations, REPLACE is still a useful editing command, par-

ticularly if you want to improve a program to make it more readable.

It is also possible to do weird things by using REPLACE inside a running interpreted Basic program. You do it at your own risk — REPLACE was intended to help you edit programs rather than as a clever way of writing self-modifying Basic.

The code for the REPLACE command is listed in two forms. Listing two gives you a quick way to enter the code without using an assembler. It loads the equivalent machine code from DATA statements and saves the code in a file. Once you have loaded that file, as follows, you can use REPLACE to alter whatever program you have loaded:

```
base=RESPR(168) : LBYTES "file
name",base:CALL base
```

The first part of listing two is Marcus Jeffery's standard loader, used in every month's DIY Toolkit project.

Only the DATA, from line 590 onwards, changes from month to month.

No Qdos call

Listing one is the assembly code program, assembled using DevPac. You can type this text into your assembler if you want to customise the code or merge it with other routines. This program is rather different from those of previous months in that it does not call the QL operating system, Qdos. Even so, it relies on a detailed knowledge of the inner workings of SuperBasic, probably the most mystifying part of the QL ROM for most hackers.

I could probably have shortened the code by using scanning routines built into the SuperBasic interpreter but that would have made the code version-dependent. There are no documented entry-points into the interpreter. The address of each routine varies with the version of your QL,



Listing 1. The Assembly Code program makes no calls to the QL operating system.

```
* QL WORLD DIY TOOLKIT - REPLACE command
* Ver. 0.4, Copyright 1988 Simon N Goodwin.
*
start   lea.l   define,a1
        move.w #110,a2      BP.INIT vector
        jmp   (a2)
*
define  dc.w   1             One procedure
        dc.w   replace-*
        dc.b   7,'REPLACE'
        dc.w   0,0,0        No functions
*
replace lea.l   2*(a3),a0
        cpa.l  a0,a5        Two parameters?
        beq.s  two_params
bad_param moveq # -15,d0
        rts
*
two_params move.w 2(a3,a6.1),d1  Index to be found
          bni.s  bad_param      Reject expressions
          move.w 10(a3,a6.1),d2  Replacement index
          bni.s  bad_param
          move.l 16(a6),a0       BV.PFBAS -> program
          move.l 20(a6),d7       BV.PFP -> program end
*
next_token addq.l #2,a0
get_token  cmp.l  a0,d7          At or past the end?
          bls.s  all_done
          move.b 0(a0,a6.1),d0  D0 is token type
          addq.l #2,a0          Skip over token word
*
          cmp.b  #239,d0        FLOATING POINT token?
          bls.s  not_afloat
          addq.l #4,a0          Skip mantissa
```

```
          bra.s  get_token
*
not_afloat cmp.b  #136,d0       NAME token?
          bne.s  not_name
          cmp.w  0(a0,a6.1),d1  Is it the target?
          bne.s  next_token
          move.w d2,0(a0,a6.1)
          bra.s  next_token
*
not_name  cmp.b  #139,d0       STRING token?
          beq.s  got_string
          cmp.b  #140,d0       TEXT token?
          bne.s  not_text
got_string moveq #3,d0         Minimum length
          add.w  0(a0,a6.1),d0  Add true length
          bclr  #0,d0          Make address even
          adda.w d0,a0          Implicitly extends D0
          bra.s  get_token
*
not_text  cmp.b  #132,d0       SYMBOL token?
          bne.s  not_symbol
          cmpi.b #10,-1(a0,a6.1) End of line?
          bne.s  get_token
          bra.s  next_token    Skip line length
*
not_symbol cmp.b  #141,d0       NEWLINE token?
          bne.s  get_token    Skip all word tokens
          move.w 0(a0,a6.1),d5  Grab new line number
          bra.s  next_token
*
all_done  moveq  #0,d0          No error to report
          rts
          end
```



Listing 4: PFBAS loader and data.

```

100 REMARK Sinclair QL World HEX LOADER
110 REMARK by Marcus Jeffery & Simon R Goodwin
120
130 Q/L
140 RESTORE : READ space : start = HEX$(space)
150 PRINT "Loading Hex..." : HEX_LOAD start
160 INPUT "Save to file: " : f$
170 GETBYTES f$, start, byte : STOP
180
190 DEFINE FUNCTION DECIMAL(x)
210 RETURN CODE$(BASE$(x)-48-7*(IN$(x)>"0"))
220 END DEFINE DECIMAL
230
240 DEFINE PROCEDURE HEX_LOAD(start)
250 byte = 0 : checksum = 0
300 REPEAT load_hex_digits
310 READ h$
320 IF h$="" : EXIT load_hex_digits
330 IF LEN(h$) MOD 2
340 PRINT "Odd number of hex digits in: " : h$
350 STOP
360 END IF
370 FOR b = 1 TO LEN(h$) STEP 2
380 hb = DECIMAL(h$(b)) : lb = DECIMAL(h$(b+1))
390 IF hb<0 OR hb>15 OR lb<0 OR lb>15
400 PRINT "Illegal hex digit in: " : h$
410 STOP
420 END IF
430 POKE start+byte, lb*16+hb
440 checksum = checksum + 16*hb + lb
450 byte = byte + 1
460 END FOR b
470 END REPEAT load_hex_digits
480 READ check$
490 IF check$ <> checksum
500 PRINT "Checksum incorrect. Recheck data"
510 STOP
520 ELSE
530 PRINT "Checksum is correct"
540 PRINT "Data entered at: " : start
550 END IF
560 END DEFINE HEX_LOAD
570 :
580 REMARK Space requirements for the machine code
590 DATA 160
600 :
610 REMARK Machine code data
620 DATA "43FA000634790000", "01104E200010010"
630 DATA "075245B04C414345", "00000000000041E2"
640 DATA "0010B0C8070470F1", "4E753233E80268F0"
650 DATA "343E50A8EFD208E", "0D102E2E0014648E"
660 DATA "2E99638A1030E800", "5482B03C00F06804"
670 DATA "588560E2H03C008E", "8E02E270E8C068DE"
680 DATA "519E2800008003C", "0080706803C008C"
690 DATA "660E7000D07DE800", "088000C000C060C0"
700 DATA "503C0084860ADC30", "000A8E2F08E200AE"
710 DATA "500C008D86AA7A30", "E30080A270004E7E"
720 DATA " ", 14993

```

making interpreter code very difficult to use in published software.

The START routine calls BP.INIT, the ROM vector which adds new commands to SuperBasic. The table labelled DEFINE indicates the name and address of the REPLACE procedure code. As usual, the command code starts by checking the parameters. A3 and A5 point to the start and end of the parameter information, with eight bytes of data for each parameter.

As in previous Toolkit routines, we check for two parameters by setting a space register to point 16 bytes past A3 and ensure that the result is the same as the value in A5. The check is performed by the five lines starting at REPLACE.

Parameter names

Then we read the parameters. Both should be names, so all we need is the index of the parameter names in the Name Table. This index is stored among the eight bytes for each parameter, so we can extract it by reading from the memory addressed by A6 — which points to Basic — and A3, the offset of parameter information.

We get a 'bad parameter' error if either name index is negative, as that would mean that the parameter supplied was a value, like 24 or X+9, rather than a single name.

The program then reads the offset of the start and end of the tokenised program from SuperBasic system variables BV.PFBAS and BV.PFP. It is important to remember that these are offsets, not addresses. The QL design means that the entire SuperBasic area can move between any one instruction and the next, as multi-tasking takes place, so all access to SuperBasic data must be relative to A6.

Whenever SuperBasic moves, the operating system updates A6 to point to the new place. You should never add A6 to an offset, except inside a single instruction, as the resultant address could become invalid at any time. If you ignore this rule you will have the worst kind of QL program, one which runs most of the time but sometimes goes haywire, depending on what else the system is doing.

The rest of the code trundles through the SuperBasic tokens, recognising each type and taking appropriate action to step on to the next. The token numbers do not seem to be grouped in any particular way, so the code is rather *ad hoc*.

Hidden tokens

A SuperBasic program is stored as a sequence of tokenised lines, in order. Each line starts with a word value, ignored by this code, which indicates the difference between the length of

the new line and the length of the previous one. After this there is a stream of tokens, with data mixed in. Each token starts at an even address.

We cannot just look through the program file for the 'name' token, a value of 136, followed by the index number of the name we want to change. If we did so we might find those values inside the data used to represent a floating point number or a string of characters and modify the wrong thing. It is necessary to read every token and take appropriate action to find the following one, skipping past intervening data.

The first check skips numbers, which are always packed into six bytes and starts with token values greater than 239. Then follows the check for a name. The token value is tested and if it is 136 the next word is read to see if it is the index number of the name we want to replace. If so, the replacement index is plugged into the program — using an A6-relative store, of course — and we go back for the next token.

Text and Strings in the program are particularly tricky to skip over as they vary in length from one instance to the next. Test is the stuff after a REMark, whereas Strings are quoted literal values, like the messages which often follow PRINT, DATA and so on. They use tokens 139 and 140 respectively.

After the token follows the code of the relevant quote character, or zero for text, then a word value indicating the length of the message, then the message. If the length of the message is odd there is an extra zero byte at the end to make sure that the next token is at an even address.

Rounding up

The code from NOT-NAME to NOT-TEXT advances over Text and Strings. It rounds up odd lengths by adding three — two for the length word plus one for rounding — to the length, then uses the BCLR instruction to re-set the least significant — odd or even — bit in the total. The ADDA.W instruction conveniently lets us add a word value to a long word address; address arithmetic always extends word values to long before adding them.

The last tricky case is the 'symbol' — token 132. It is followed by a byte between 1 and 10, indicating what particular symbol is encoded — brackets, colons or other symbols as listed in Appendix C of Jan Jones' *QL SuperBasic — The Definitive Handbook*.

Symbol type 10 indicates the end of a line. We must check for this code, so that we do not become confused by the subsequent 'change of length' word

between each tokenised line and the next.

The final check looks for token 141, NEW-LINE. It is followed by a word value, the number of the new line. All other token values use fixed-size, two-byte entries, so the code just skips them and goes to the next. For the record, the token names are SPACE, KEYWORD, OPSYM, MONOSYM and SEPARATOR; the corresponding values are 128, 129, 133, 134 and 142.

REPLACE keeps the current line-number in D5 as it works, in case you want to soup up the code to allow two more parameters. You could then REPLACE names within a limited range of lines:

```
REPLACE VAL , InitialValue , 1000 TO 1530
```

This extra feature would make REPLACE useful in several new circumstances. It should be easy to develop code to accept and check a line-number range. If you are stuck, try to adapt the required code from previous DIY Toolkit listings.

● *Next month: more code and commentary. If you would like me to explore a specific area or implement new commands, particularly ones unavailable in commercial toolkits, please send your suggestions.*

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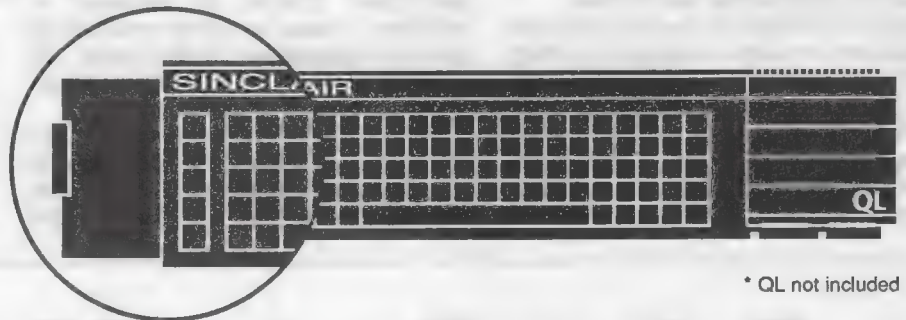
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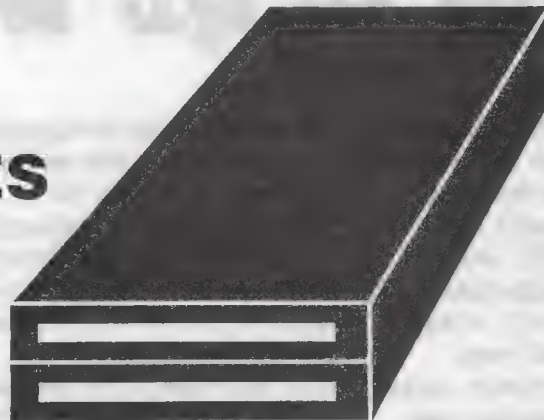
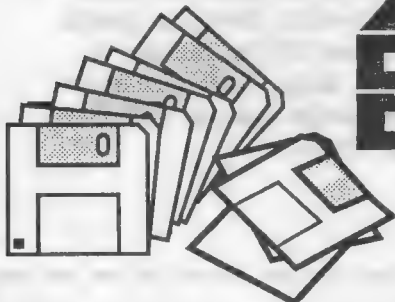
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TECHNICAL HELPLINE

Paul Walton looks at copy-protection, printer connections and choosing a colour monitor.

Safer software

T. Kareinen, a Finnish reader, writes to ask how he can copy-protect his own cartridges.

Because of popular demand, here is an introduction to protecting your cartridges. Let me first remind you what I said two months ago; someone will always beat it.

A simple protection routine will serve as an example of how to approach the problem. We will produce a formatted cartridge which is completely open to access, except that copies of it will be identifiable as such. This enables you to use the popular approach of allowing the user to run the program from a copy so long as the original is in one of the drives.

The first step is to format the cartridge intended to become the original with some 'identification mark'. We shall use the medium title set by the FORMAT command. Take a spare cartridge, put it in mdv2 and run the following program:

```
10 name$ = "mdv2-te" &  
CHR$(1) & CHR$(2) & "st"  
20 FORMAT name$
```

If you now DIR mdv2 you will see that the CHR\$(1) and CHR\$(2) part of the name are printed as an anonymous blob, the non-printing character symbol. By using, say, six of these hidden characters, an illegal copy cannot easily be produced with the same medium title. To do so requires the copier to be very lucky, very patient,

own a copying program or know how to write the assembly language routine which will tell him the missing characters.

As the producer of the software to go on the cartridge, you can then include an assembly language routine to read the medium title and check it as being the original. Now we face the inevitable dilemma. If I tell you how to write the assembly language to do it I am also telling everybody how to defeat us. Will anyone intending to make illegal copies of software please close their eyes for nine lines:

```
MOVEQ #1,D1          current job ID  
MOVEQ #4,D3          access a directory file  
LEA   DRIVE(PC),AO  point to the device name  
MOVEQ #1,DO          code for open a channel  
TRAP  #2             do it  
  
MOVEQ #1,D3          indefinite timeout  
LEA   INFO(PC),A1   point to space for title  
MOVEQ #69,DO        code for get medium info  
TRAP  #3             get it  
  
(your checking routine goes  
here)  
(and your program follows)  
(you also need the data  
declaration below)  
  
INFO  DEFS 10        for the medium title  
DRIVE DEFB 'MDV2-'  the medium being checked
```

After the TRAP #3 call, the ASC11 codes of the medium title will be in the INFO data area, hidden characters and all.

For a detailed explanation of the format of a cartridge you should read the Of Discs and Drives article in the January, 1986 issue of *QL World*. This will give you some ideas of your own for protecting your software. Let me finish by reminding you that if you sell your work to a customer they deserve a usable product for their

money and copy-protection is often contrary to that principle.

A number of readers have written with queries about printers. G. S. Triggs of Hampton writes: "Recently I purchased a shop-soiled serial 8056, without a manual or instructions—help."

I telephoned a few Dixons branches to find someone with the 8056 in stock. Finally I reached Skegness and they were most helpful; they even promised to send a copy of the manual.

The protocols for this printer are 1,200 baud, 8-bit data, no parity, 1 stop bit and DTR on.

change the DIP switches to set it to, say, 9,600 baud. In case you have no manual, the Star technical department can be contacted on 01-840 1800.

QL colour

J. Whitehouse asks for advice on choosing a colour monitor for his QL, explaining that he is unable to find one in any of the leading shops in Birmingham.

If you do not want to risk the possible problems associated with mail order, one alternative is to have a local computer shop order you a monitor so that you can see it working before you buy. As these monitors definitely exist; unlike some mail order equipment, there seems little to fear in the mail order approach. I take it you do not want to travel to a supplier, always a good idea if you want to see the alternatives.

Several readers have asked me to recommend a monitor. The QL was designed to produce an 85-column monitor screen compared to the more usual 80 characters. This apparent generosity means that some care is needed in choosing a monitor, otherwise you find that the first five characters of each line never appear. So as long as you choose a monitor advertised for use with a QL all will be well.

Which one should you choose? You get what you pay for but whichever make of QL monitor you choose you will find the difference, compared to a TV set, startling — and for about £250 or more it should be.

Star setting

Ian Fisher of Worcester asks: Can you publish the Quill details for the Star NL10?

I presume you want to know the INSTALL—BAS commands to configure this printer for use with Quill and so on. The NL10 can use the standard Epson FX80 driver, included in the INSTALL—BAS options. This printer is set to 19,200 baud, so you may need to

THE

P + R = O = G < S

If you have a program worthy of consideration, send it to 'The Progs',
Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.
We pay for everything published at the usual page rates.

Program of the month

VICIOUS VIPER by I. Humpreys

This version of Snake game. The object is to eat the eggs represented by the * sign while avoiding the walls around the playing area, represented by solid red blocks, and your own tail. For every egg eaten, you score one point and your tail gains one section in length.

From time to time bonus eggs will appear, represented by a % sign. For these you can score between five and 10 points. Bricks, represented by solid magenta blocks, also appear, and you must avoid or destroy them by pressing the space bar, or the fire button on a joystick, when you are alongside them.

When you have consumed all the eggs on a screen, a time bonus may be added to your score if you were fast enough, and another more difficult screen appears.

Movement is by the use of the left and right cursor keys, which turn the snake's head left or right.

The sound can be disabled by pressing F2, or enabled by pressing F1. If you want to restart the game during play, press Escape.

Program notes

The game revolves round two main data structures. The first is the board array B, which contains a representation of the screen display, as follows: 'O' signifies a blank space, '1' signifies an egg, '2' signifies a bonus egg, '3' signifies a brick, '4' signifies the snake's tail and '5' signifies the permanent wall. The second data structure is a pair of arrays x and y, which keep track of the snake. Two pointers are used to access the arrays, h which represents the current position of the snake's head and t which represented the position of the tail.

The main program loop consists of the following: first, the current position of the snake's head is retrieved from the x and y

arrays. A new position is calculated according to the current direction of travel (dirn). The contents of the board array at this position of the snake's head is retrieved from the x and y arrays. A new position is then consulted. If it is blank, we are able to continue. If it is an egg or bonus egg, the procedure "kill" is called. This procedure uses a variable "adding" to keep track of the number of tail segments remaining to add to the snake. If the board contents are either a brick or a wall, a life is cancelled by setting the flag "dead". If we are still alive, the h pointer is updated and the new position is written to the x and y arrays and the screen is updated. The x and y arrays are then consulted to get the position of the current end of the snake's tail. If the tail is to be lengthened, the variable "adding" is decremented. Alternatively, the end of the tail is deleted and the t pointer is updated.

The placing of the bricks

and bonus eggs is controlled by two timers wc and bc. They are set to a random value in the range (wl . . . wh) or (bl . . . bh) and are decremented every time round the main program loop. When they reach zero either a brick or a bonus egg is placed randomly on the board. The timers are then re-set. The next time the bc timer reaches zero, the bonus egg is removed from the board. The position of the bonus egg is kept in bx and by.

The various screen are set up via the procedure "setuplevel" which calls one of a number of procedures depending on the current value of "level." These procedures set up the pattern of permanent walls within the board. All random placings are done by the procedure "spare," which generates random board positions until an unoccupied one is found. The corresponding entry in the board array b is then set and the specified character is written to the screen.

```

1000 REMark *****
1010 REMark *
1020 REMark * VICIOUS VIPER *
1030 REMark *
1040 REMark * BY *
1050 REMark *
1060 REMark * I S HUMPHREYS *
1070 REMark *
1080 REMark * July 1984 *
1090 REMark *
1100 REMark *****
1110 REMark
1120 setupgame
1130 REPEAT game
1140 level=1:sc=0:lives=2:CLS £4
1150 rules:dead=true
1160 REPEAT loop
1170 setuplevel
1180 play
1190 IF dead THEN
1200 lives=lives-1:flashviper
1210 IF lives<0 THEN EXIT loop
1220 ELSE
1230 addbonus
1240 level=level+1
1250 END IF
1260 END REPEAT loop
1270 hiscores
1280 AT £3,15,8:PRINT £3,'Another Game ? ':
1290 REPEAT getans
1300 a$=INKEY$(-1)
1310 IF a$='n' OR a$='N' THEN EXIT game
1320 IF a$='y' OR a$='Y' THEN EXIT getans
1330 END REPEAT getans
1340 END REPEAT game
1350 CLOSE £3:CLOSE £4:CLOSE£5
1360 CLS
1370 REMark
1380 REMark *****
1390 REMark * PLAY *
1400 REMark *****
1410 REMark
1420 DEFINE PROCEDURE play
1430 REPEAT playing
1440 hx=x(h):hy=y(h):tx=x(t):ty=y(t)
1450 updatetime
1460 key=CODE(INKEY$(0))
1470 SELECT ON key
1480 =escape:dead=1:lives=0:EXIT playing
1490 =right:dirn=(dirn+3)MOD 4
1500 =left:dirn=(dirn+1)MOD 4
1510 =space:fire
1520 =f1:quiet=true
1530 =f2:quiet=false
1540 END SELECT
1550 getfront nx,ny
1560 it=b(nx,ny)
1570 SELECT ON it
1580 =0
1590 =1:kill 1
1600 =2:kill RND(5 TO 10):bc=RND(b1 TO bh):bonu
s=0
1610 =REMAINDER :dead=1
1620 END SELECT
1630 IF dead THEN EXIT playing
1640 AT £3,ny,nx:PRINT £3,CHR$(192)
1650 b(nx,ny)=4:h=(h+1)MOD 256
1660 x(h)=nx:y(h)=ny
1670 IF adding THEN add: ELSE deletetail
1680 IF nobj=0 AND adding=0 THEN EXIT playing
1690 wc=wc-1:IF wc=0 THEN placebrick
1700 bc=bc-1:IF bc=0 THEN placebonus
1710 END REPEAT playing
1720 END DEFINE
1730 REMark
1740 REMark *****
1750 REMark * SPARE *
1760 REMark *****
1770 REMark
1780 DEFINE PROCEDURE spare(x,y,n,a$)
1790 REPEAT sparepoint
1800 x=RND(0 TO 30)
1810 y=RND(0 TO 16)
1820 IF b(x,y)=0 THEN EXIT sparepoint
1830 END REPEAT sparepoint
1840 b(x,y)=n
1850 AT £3,y,x:PRINT £3,a$
1860 END DEFINE
1870 REMark
1880 REMark *****
1890 REMark * GET FRONT *
1900 REMark *****
1910 REMark
1920 DEFINE PROCEDURE getfront(x,y)
1930 SELECT ON dirn

```

```

1940 =0:x=hx:y=hy+1
1950 =1:x=hx+1:y=hy
1960 =2:x=hx:y=hy-1
1970 =3:x=hx-1:y=hy
1980 END SELECT
1990 END DEFINE
2000 REMark
2010 REMark *****
2020 REMark * KILL *
2030 REMark *****
2040 REMark
2050 DEFINE PROCEDURE kill(n)
2060 nobj=nobj-1
2070 adding=adding-n
2080 END DEFINE
2090 REMark
2100 REMark *****
2110 REMark * DELETE TAIL *
2120 REMark *****
2130 REMark
2140 DEFINE PROCEDURE deletetail
2150 tx=x(t):ty=y(t):b(tx,ty)=0
2160 t=(t+1)MOD 256
2170 AT £3,ty,tx:PRINT £3,' '
2180 END DEFINE
2190 REMark
2200 REMark *****
2210 REMark * ADD *
2220 REMark *****
2230 REMark
2240 DEFINE PROCEDURE add
2250 adding=adding-1:sc=sc+1
2260 updatescore
2270 IF quiet THEN RETURN
2280 BEEP 1000,10,40,100,10
2290 END DEFINE
2300 REMark
2310 REMark *****
2320 REMark * PLACE BRICK *
2330 REMark *****
2340 REMark
2350 DEFINE PROCEDURE placebrick
2360 PAPER £3,3:spare xx,yy,3,' '
2370 PAPER £3,0:wc=RND(w1 TO wh)
2380 END DEFINE
2390 REMark
2400 REMark *****
2410 REMark * PLACE BONUS *
2420 REMark *****
2430 REMark
2440 DEFINE PROCEDURE placebonus
2450 IF bonus THEN
2460 AT £3,by,bx:PRINT £3,' '
2470 IF b(bx,by)=2 THEN b(bx,by)=0
2480 nobj=nobj-1:bonus=0
2490 bc=RND(b1 TO bh)
2500 ELSE
2510 FLASH £3,1
2520 spare bx,by,2,'% '
2530 FLASH £3,0
2540 nobj=nobj+1:bonus=1
2550 bc=RND(b1 TO bh)
2560 END IF
2570 END DEFINE
2580 REMark
2590 REMark *****
2600 REMark * FIRE *
2610 REMark *****
2620 REMark
2630 DEFINE PROCEDURE fire
2640 getfront x1,y1
2650 obj=b(x1,y1)
2660 IF obj>3 THEN RETURN
2670 AT £3,y1,x1:PRINT £3,'+'
2680 IF NOT quiet THEN BEEP 1000,10,20,30,1
2690 AT £3,y1,x1
2700 SELECT ON obj
2710 =0:PRINT £3,' '
2720 =1:PRINT £3,'*'
2730 =2:FLASH £3,1:PRINT £3,'%':FLASH £3,0
2740 =3:PRINT £3,' ':b(x1,y1)=0
2750 END SELECT
2760 END DEFINE
2770 REMark
2780 REMark *****
2790 REMark * UPDATE SCORE *
2800 REMark *****
2810 REMark
2820 DEFINE PROCEDURE updatescore
2830 CURSOR £4,332,6:PRINT £4,sc
2840 END DEFINE
2850 REMark
2860 REMark *****
2870 REMark * UPDATE TIME *
2880 REMark *****

```

PROGS

```

2890 REMark
2900 DEFine PROCEDURE updatetime
2910 time=99-(DATE-start)
2920 IF time<0 THEN time=0
2930 CURSOR £4,92,6:PRINT £4,time;' ';
2940 END DEFine
2950 REMark
2960 REMark *****
2970 REMark * UPDATE LIVES *
2980 REMark *****
2990 REMark
3000 DEFine PROCEDURE updatelives
3010 CURSOR £4,212,6:PRINT £4,lives
3020 IF quiet THEN RETURN
3030 BEEP 1000,5
3040 END DEFine
3050 REMark
3060 REMark *****
3070 REMark * ADD BONUS *
3080 REMark *****
3090 REMark
3100 DEFine PROCEDURE addbonus
3110 IF time=0 THEN RETURN
3120 FOR i=time TO 0 STEP -1
3130 CURSOR £4,92,6:PRINT £4,i;' ';
3140 sc=sc+1:updatescore
3150 IF NOT quiet THEN BEEP 1000,10,40,100,10
3160 END FOR i
3170 END DEFine
3180 REMark
3190 REMark *****
3200 REMark * WAIT *
3210 REMark *****
3220 REMark
3230 DEFine PROCEDURE wait(delay)
3240 init=DATE
3250 REPEAT waiting
3260 IF (DATE-init)>delay THEN EXIT waiting
3270 END REPEAT waiting
3280 END DEFine
3290 REMark
3300 REMark *****
3310 REMark * FLASH VIPER *
3320 REMark *****
3330 REMark
3340 DEFine PROCEDURE flashviper
3350 IF t>h THEN h=h+256
3360 FLASH £3,1
3370 FOR i=t TO h
3380 j=1 MOD 256
3390 AT £3,y(j),x(j):PRINT £3,CHR$(192)
3400 END FOR i
3410 FLASH £3,0
3420 wait 5
3430 END DEFine
3440 REMark
3450 REMark *****
3460 REMark * HISCORES *
3470 REMark *****
3480 REMark
3490 DEFine PROCEDURE hiscores
3500 i=1
3510 REPEAT hi
3520 IF sc>hs(1) THEN EXIT hi
3530 i=i+1
3540 IF i=11 THEN EXIT hi
3550 END REPEAT hi
3560 IF i<11 THEN
3570 IF i<10 THEN
3580 FOR j=10 TO i+1 STEP -1
3590 hs(j)=hs(j-1)
3600 hn$(j)=hn$(j-1)
3610 END FOR j
3620 END IF
3630 hs(i)=sc
3640 hn$(i)=''
3650 END IF
3660 CLS £3:CLS £4
3670 PRINT £3
3680 CSIZE £3,3,1
3690 PRINT £3,' Hi - scores'
3700 CSIZE £3,2,0
3710 FOR j=1 TO 10
3720 AT £3,j+3,2:PRINT £3,j;
3730 AT £3,j+3,7:PRINT £3,hs(j);
3740 AT £3,j+3,14:PRINT £3,hn$(j);
3750 END FOR j
3760 IF i<11 THEN
3770 AT £3,1+3,14
3780 INPUT £3,hn$(1)
3790 END IF
3800 END DEFine
3810 REMark
3820 REMark *****
3830 REMark * SET UP GAME *

```

```

3840 REMark *****
3850 REMark
3860 DEFine PROCEDURE setupgame
3870 bl=30:bh=50:wl=30:wh=50
3880 black=0:blue=1:red=2:magenta=3
3890 green=4:cyan=5:yellow=6:white=7
3900 left=192:right=200:space=32:escape=27
3910 f1=232:f2=236
3920 false=0:true=1
3930 DIM b(30,16),x(255),y(255),hs(10),hn$(10,15)
3940 FOR i=1 TO 10
3950 hs(i)=1000-i*100:hn$(i)='Vicious Viper'
3960 END FOR i
3970 MODE 256
3980 WINDOW 512,256,0,0
3990 PAPER green:CLS
4000 OPEN £3,con_372x170a70x50_15
4010 PAPER £3,black:INK £3,green:CLS £3
4020 OPEN £4,scr_404x20a54x230
4030 PAPER £4,white:INK £4,black:CLS £4
4040 OPEN £5,scr_362x28a72x12
4050 PAPER £5,green:INK £5,red
4060 CSIZE £5,2,1:BORDER £5,4,blue
4070 n$=' V I C I O U S V I P E R '
4080 PRINT £5,n$;
4090 quiet=false
4100 END DEFine
4110 REMark
4120 REMark *****
4130 REMark * SET UP LEVEL *
4140 REMark *****
4150 REMark
4160 DEFine PROCEDURE setuplevel
4170 CLS £3
4180 PAPER £3,red
4190 SElect ON level
4200 =1:setlev1
4210 =2:setlev2
4220 =3:setlev3
4230 =4:setlev4
4240 =5:setlev5
4250 =6:setlev6
4260 =7:setlev7
4270 =8:setlev8
4280 =9:setlev9
4290 =10:setlev10
4300 =11:CLS £4:CURSOR £4,96,6:PRINT £4,' G i v
e U p ! ! '
4310 wait 2:level=1:setlev1:CLS £4:dead=true
4320 END SElect
4330 AT £3,0,11:PRINT £3,' LEVEL ':level;
4340 PAPER £3,black
4350 b(16,1)=4
4360 nobj=RND(30 TO 50)
4370 FOR i=1 TO nobj:spare xx,yy,1,'*'
4380 t=0:h=0:bc=RND(bl):wc=RND(wl)
4390 x(0)=16:y(0)=1:dirn=0
4400 adding=0:bonus=false:start=DATE
4410 CURSOR £4,20,6:PRINT £4,' Bonus'
4420 CURSOR £4,140,6:PRINT £4,' Lives'
4430 CURSOR £4,252,6:PRINT £4,' Score'
4440 updatescore:updatetime
4450 IF dead THEN updatelives:dead=false
4460 i=KEYROW(1)
4470 END DEFine
4480 REMark
4490 REMark *****
4500 REMark * SCREEN SETUPS *
4510 REMark *****
4520 REMark
4530 DEFine PROCEDURE setlev1
4540 FOR i=0 TO 30
4550 FOR j=0 TO 16
4560 b(i,j)=0
4570 END FOR j
4580 END FOR i
4590 FOR i=0 TO 30
4600 b(i,0)=5:AT £3,0,i:PRINT £3,' '
4610 b(i,16)=5:AT £3,16,i:PRINT £3,' '
4620 END FOR i
4630 FOR j=1 TO 15
4640 b(0,j)=5:AT £3,j,0:PRINT £3,' '
4650 b(30,j)=5:AT £3,j,30:PRINT £3,' '
4660 END FOR j
4670 END DEFine
4680 REMark
4690 DEFine PROCEDURE setlev2
4700 setlev1
4710 FOR i=8 TO 22
4720 b(i,8)=5:AT £3,8,i:PRINT £3,' '
4730 END FOR i
4740 END DEFine
4750 REMark
4760 DEFine PROCEDURE setlev3
4770 setlev1

```

```

4780 FOR i=1 TO 5,11 TO 15
4790 b(15,i)=5:AT £3,1,15:PRINT £3,' '
4800 END FOR i
4810 END DEFINE
4820 REMark
4830 DEFINE PROCEDURE setlev4
4840 setlev1
4850 FOR i=8 TO 22
4860 b(i,5)=5:AT £3,5,1:PRINT £3,' '
4870 b(i,11)=5:AT £3,11,1:PRINT £3,' '
4880 END FOR i
4890 END DEFINE
4900 REMark
4910 DEFINE PROCEDURE setlev5
4920 setlev1
4930 FOR i=1 TO 6,10 TO 15
4940 b(10,i)=5:AT £3,1,10:PRINT £3,' '
4950 b(20,i)=5:AT £3,1,20:PRINT £3,' '
4960 END FOR i
4970 END DEFINE
4980 REMark
4990 DEFINE PROCEDURE setlev6
5000 setlev1
5010 FOR i=1 TO 8,11 TO 19,22 TO 29
5020 b(i,8)=5:AT £3,8,1:PRINT £3,' '
5030 END FOR i
5040 END DEFINE
5050 REMark
5060 DEFINE PROCEDURE setlev7
5070 setlev5
5080 FOR i=12 TO 18
5090 b(i,8)=5:AT £3,8,1:PRINT £3,' '
5100 END FOR i
5110 END DEFINE
5120 REMark
5130 DEFINE PROCEDURE setlev8
5140 setlev6
5150 FOR i=1 TO 6,10 TO 15
5160 b(15,i)=5:AT £3,1,15:PRINT £3,' '
5170 END FOR i
5180 END DEFINE
5190 REMark
5200 DEFINE PROCEDURE setlev9

```

```

5210 setlev8
5220 FOR i=3 TO 13
5230 b(8,i)=5:AT £3,1,8:PRINT £3,' '
5240 b(22,i)=5:AT £3,1,22:PRINT £3,' '
5250 END FOR i
5260 END DEFINE
5270 REMark
5280 DEFINE PROCEDURE setlev10
5290 setlev9
5300 FOR i=3 TO 7,23 TO 27
5310 b(i,4)=5:AT £3,4,1:PRINT £3,' '
5320 b(i,12)=5:AT £3,12,1:PRINT £3,' '
5330 END FOR i
5340 END DEFINE
5350 REMark
5360 REMark *****
5370 REMark * RULES *
5380 REMark *****
5390 REMark
5400 DEFINE PROCEDURE rules
5410 CLS £3 : INK £3,yellow
5420 PRINT £3
5430 PRINT £3,' Vicious Viper Rules '
5440 PRINT £3,' ----- '
5450 PRINT £3
5460 PRINT £3,' < Turn Viper LEFT '
5470 PRINT £3,' = Turn Viper RIGHT '
5480 PRINT £3,' SPACE Fire '
5490 PRINT £3
5500 PRINT £3,' * Scores 1 Point '
5510 FLASH £3,1:PRINT £3,' X':FLASH £3,0
5520 PRINT £3,' Bonus Scores 5 - 10 Points'
5530 PRINT £3
5540 PRINT £3,' F1 Sound OFF '
5550 PRINT £3,' F2 Sound ON '
5560 PRINT £3
5570 PRINT £3,' Hit SPACE To Start '
5580 REPEAT getspace
5590 ans$=INKEY$(-1)
5600 IF ans$=' ' THEN EXIT getspace
5610 END REPEAT getspace
5620 END DEFINE

```

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PSION SOLUTIONS

Ron Massey writes about the problems of getting hard copy from Psion quartet programs.

Obtaining hard copy from the Psion programs seems to be a major difficulty for the many users. Most of the problems occur because of different control code standards adopted by printer manufacturers. Compounding the problem further, printers from the same manufacturer may or may not incorporate the same code standards across their range of models.

To obtain the best results from a dot matrix printer, a careful study must be made of its control code requirements. The codes will enable you to alter typeface and size. In addition, if your printer supports graphic printing, you will be able to switch into any of the graphic modes available to it.

Instruction manuals vary enormously in their degree of user-friendliness. Most of the better manuals include a summary of their control codes in a separate table; other manuals seem to delight in hiding that vital information in a mountain of text.

Whichever extreme your manual takes, the type of printer codes you will need to find usually begins with ESC or chr\$(27) and is followed by either a decimal or a hexadecimal number. Some codes are indicated by mnemonics letter codes. The Psion install—bas will usually accept any of the three forms as a legal control codes.

It should be noted that character case for mnemonic codes is of vital importance. The Canon mnemonic code ESC,"S",1 turns on subscript; ESC,"s",1 sets the Canon to half printing speed.

The next point to remember about control codes is that the majority of

the character modes require a code to switch them on and another to switch them off. Typically, Canon, which is nominally Epson-compatible, uses, among others, the following codes:

Function	Switch on	Switch off
Printer re-set — usually used within the printer driver preamble.		
	Mnemonic: ESC "a"	
	Decimal: chr\$(27),chr\$(64)	
Bold	Mnemonic: ESC "E"	ESC "F"
	Decimal: chr\$(27),chr\$(69)	chr\$(27):chr\$(70)
Italics	Mnemonic: ESC "4"	ESC "5"
	Decimal: chr\$(27):chr\$(52)	chr\$(27):chr\$(53)
Condensed	Mnemonic: ESC SI	ESC DC2
	Decimal: chr\$(27):chr\$(15)	chr\$(27):chr\$(18)
Expanded	Mnemonic: ESC "W" 1	ESC "W" 0
	Decimal: chr\$(27):"W":chr\$(50)	chr\$(27):"W":chr\$(49)
Elite	Mnemonic: ESC "M"	another typeface mnemonic
	Decimal: chr\$(27):chr\$(77)	another typeface decimal

If your printer manual is somewhat less than helpful as a working guide, it would be useful to make a list, summarising the control codes you will need for your applications. Once you have done that you should consider making a list of the settings you will require for your dot matrix printer DIP switches; they will determine the default printer set-up when it is first switched on.

Characters

The next consideration concerns which characters, if any, require translation from one into another when a document is printed. When entering a character into a printer driver which the install—bas routine is to convert for translation, the first character in the driver is the QL character contained in quotation marks required for printing, followed by a comma and the ASCII character

code from which it is to be translated the character you will see on-screen if it is a printable character.

Once you have built a driver to your requirements, press <ESC> to quit the edit option and press <F4> to save it. If you wish to install a particular driver, press the UP/DOWN cursor keys to select the required driver and press <F5> to install it.

If you use different printer drivers for Abacus, Archive and Easel, there

are two options available to you. The first is that you can build a set of different printer drivers, each with its own control codes for each of the Psion programs and title each "Driver Name" with, for example, "Brother, Abacus, A4".

As you change to each of the Psion programs you will also need to change printer drivers by running install—bas, selecting the appropriate driver from your list and pressing <5> to install it. Alternatively, you can use the method covered in the first instalment of Psion Solutions in which modifications for the install—bas were detailed. A certain amount of caution should be observed when taking this approach.

Modifying the filenames of the printer drivers also requires altering each of the Psion programs so that, when the "Print" option is selected, the relevant printer driver is called.



When I altered my programs, I used the DP *The Editor* to do so. There are probably other methods which will work equally well but *The Editor* is ideal for the job.

A final comment regarding the modification of the Psion programs using *The Editor*. There seems to be some confusion in one reader's approach to using *The Editor* for this purpose. The Editor loads a file with either the "R" (for Read) or the "RU" (for Read a document without page-formatting it) command. To process any binary file, whether in the form of machine code or a compiled SuperBasic program, the "RU" command must be used. Failure to observe this requirement will result in truncated program lines and, if saved in this form, a non-functional partial program.

After the file is processed it is saved with the "W" (for Write) command. The saved file will then run by whatever command it required originally, either by EXECing or LBYTES and CALLing.

With a different printer driver-related problem a reader, in addition to trying to use a driver which is incompatible with his Sinclair badged printer, is selecting the Quill "Print" option for each document page on to A4 sheets. Having looked at a photocopy of the driver I would suggest that the writer first studies the foregoing comments and then makes this small modification to his driver where the option is offered for "Continuous Forms", select "No", using the LEFT/RIGHT cursor keys — the choices toggle between "Yes" and "No".

Having done that, insert the relevant control codes next to each option in the menu as required, press <ESC> to quit editing and press <F5> to install the new driver. Once that has been done, press <ESC> again to quit installbas and then <ENTER> to return to SuperBasic.

Pause and prompt

The source of the problem is that his driver is telling the printer that it is using continuous paper. Once the driver is altered so that it is sending the correct information to the printer for cut sheets, Quill will pause automatically at the end of each page and prompt for a new sheet of paper. Page numbering will occur consecutively and document headers and footers will appear in their correct positions.

Another reader wishes to eliminate

the word "Page" when printing a page number. Although Quill has default values for its options, any of them may be changed by pressing the keys accessing the various menus and following the prompts at the top of the screen. In this case, press <F3> and then <F>. This will produce a prompt near the bottom of the screen:

Command footer, centre

Pressing <SPACE> will sequentially alter the last word in the prompt line to:

right, none, left, centre

Once satisfied with the page position of the footer, press <ENTER>. This

will change the prompt to:

Page nnn

The prompt line can then be edited like any Quill document by using <CTRL> and the LEFT/RIGHT cursor keys. Additional footer information may also be typed in. Once satisfied with the footer information, press <ENTER> again. The prompt line will now read:

Footer margin, 2

The number indicates the line spacing between the last line of text and the footer. Any number between 0 and 9 may be entered. Having completed the selection, press <ENTER> and the prompt line will read:

Bold

There are only two options available for this stage—press <ENTER> to have the footer printed in bold typeface or "N" to have a footer printed in the current normal typeface.

Easel error

A misprint occurred in the listing for the modification required to the Psion Easel gprint—prt printer driver which appeared in the August issue. A number of readers have asked why they get an error message: "at line 120, bad parameter". The line should have read:

120 POKE addr @. 181.5

A reader has supplied an ingenious method of acquiring additional translate functions. Word processors have printer control codes displayed in a block of text where they are required. Quill is unusual in that four of the for Bold, Underline, Sub and Superscript are indicated by a change in either screen typeface, screen colour or both.

If <CTRL> and <ESC> are entered, producing a lower-case "a" with an umlaut, the character immediately following will be regarded as a control character if the printer regards

it as a legitimate code and will switch modes.

While this solution provides eight/nine translates so that other commands which use non-character functions are available, the one possible disadvantage with this method is that right-justified text will have at least two characters per line missing where the control characters are located when the document is printed.

Regulator crash

The Rev C. H. Wolff relates two serious problems he is experiencing with Quill. It will not load a saved file, and, occasionally, after scrolling a document, the Quill cursor disappears and the program siezes. Although neither the version of Quill nor the ROM version was mentioned, since he states that he has used his QL for a number of years it is reasonable to assume that his QL is either an AH or JM and the Quill version is either version 1.00 or 2.00.

If those assumptions are correct, the first problem is almost certainly software-originated and the latter is most probably hardware. Although I have never used version 1.00 of Quill, the horror stories I have heard about it make me wonder how Quill ever survived. Although considerably improved, version 2.00 included a serious bug in that it would not save a file greater than 32K in length. In my experience saving even smaller files was difficult.

The second problem is most probably due to the QL voltage regulator. Some early QLs used a voltage regulator which was only just adequate for the job. Any add-ons increased the chances of an eventual crash; even without add-ons, unpredictable lock-ups are a probability, as opposed to a possibility.

That the problem becomes most evident whenever scrolling a document in Quill is almost coincidental and would occur with any program where large blocks of memory are being moved. The most likely solutions may be to upgrade to the most current version of Quill commonly available, version 2.3.

The second problem can usually be cured inexpensively by upgrading to a higher-capacity voltage regulator. Although replacement is simple and requires no soldering, there are several reliable companies in the QL market which offer a fast service at reasonable prices.



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il porte	portons!	il portera	il a porté
nous portons	portez!	nous porterons	nous avons porté
vous portez	portez!	vous porterez	vous avez porté
ils portent		ils porteront	ils ont porté
imperfect	conditional	pluperfect	past historic
je portais	je porterais	j'avais porté	je portai
tu portais	tu porterais	tu avais porté	tu portas
il portait	il porterait	il avait porté	il porta
nous portions	nous porterions	nous avions porté	nous portâmes
vous portiez	vous porteriez	vous aviez porté	vous portâtes
ils portaient	ils porteraient	ils avaient porté	ils portèrent

Arrow: Linked ENTER:Next ESC:Exit
Use cursor keys to select/move arrows
C:Clear R:Restore S:Swap L:Link

Window: Question No.: 4
Mode: Insert F3:Commands ESC:Exit

Which is a line joining areas of equal rainfall over a period

F1 isohyet

F2 isobar

F3 isoneph

F4 isobath

They are all lines joining places with an equal value of some element.

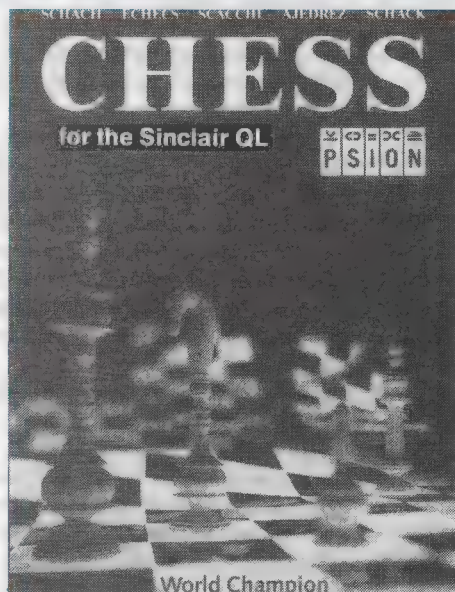
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isobar = pressure

isoneph = average cloudiness

isobath = points on the sea bed with equal depth

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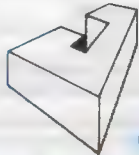
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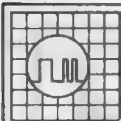
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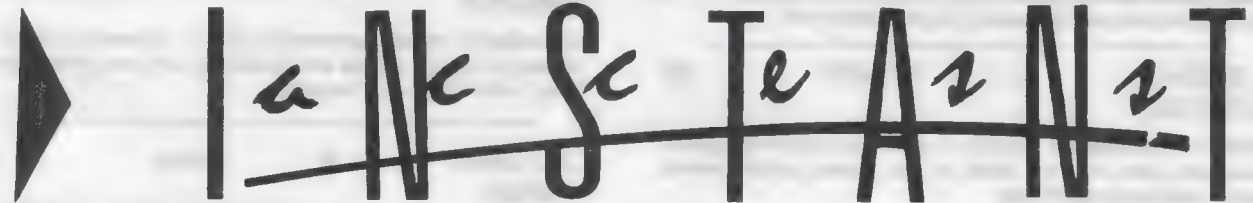
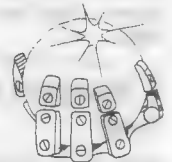
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MICRO DRIVE

THE PROGRAMS

1. Giles Todd B DIY Assembler £5

Featured in the March to June 1985 issues of *QL User*, this complete two-pass assembler will assemble all 68008 code and support the assembler directives DRG, END, EQU, DC and DS.

2. Richard A + O Mini Monitor £3
Cross

Using approximately 3K of RAM, this utility multi-tasks on your QL, leaving plenty of room for other programs. Commands include dumping registers, memory and ASCII machine code trace, register store, memory move, memory store — byte, word and long — and jumps. *QL User*, October 1985.

4. Shergold & B Golf £2
Tose

With up to 50 courses of varying difficulty, lakes, rivers, bunkers and trees. You decide the power and direction of each stroke, striving for a birdie, eagle or even an albatross. Your scorecard may be saved. *QL User*, May 1985.

5. Williams A + O Paladin £5
& Holliday

Written completely in machine code, this excellent *Space Invaders* game was the basis of our games programming series, started in April 1985.

7. Steve Deary B Pacman £1

Almost 20 screens of increasing difficulty, including an invisible maze, make it a very versatile rendition of the arcade favourite. *QL User*, March 1985.

8. Andy B Family Tree £3
Carmichael

An Archive program and database for setting-up and displaying large family trees. See *Theory of Relativity*, *QL User*, July and August 1985.

9. James Lucy L Composer £3

Completed in *QL User*, October 1985, this QLiberated program will allow you to compose, play and edit music. The program will handle sharps, vary tempo, and specify staccato and legato playing styles.

17. Tony Quinn S CAD QL £4

CAD design programs are particularly suited to the QL. This version includes rubber-banding and a user-definable symbol library. *QL World*, September 1988.

19. Karl Jeffrey M + B Starport 2001 £3

Fast machine code action in this version of the *Galaxians* arcade game. *QL World*, November 1986.

24. J F Tydeman S Design 3D £4

3D screen designs with the minimum of fuss and aggravation. *QL World*, March/April 1987.

25. D Carmona B Stellaris £4

This is an extensive real-time space adventure game against the computer, including economic simulations, lunar landing and superb graphics. *QL World*, June 1987.

29. Peter B Bridge £4
Etheridge

An excellent version of this popular card game. Features include accurate computer bidding, automatic or manual play, replay hands, correct scoring, save and load positions and more.

32. Phillip B Advent2 £4
Sproston

SuperBasic arcade adventure with a humorous slant. A variety of rooms, robots and problems will keep you on your toes. Full instructions included.

33. Leslie B Clock £3
Fahidy

This is a complete version of the clock program, described in the June and July 1987 issues of our QL Education series. An on-screen clock can be used to set or read the time.

34. E Bamber QL Conversion/ £2
Calculator

Weights and measures units, conventions and reverse Polish calculation, this utility will convert almost anything to anything. Completely menu-driven, it is very easy to use.

35. John B Qwhist £3
Wakefield

Designed for one player (south) who partners a computer hand (north) against the computerised east and west opponents. *QL World*, August 1987.

36. Stanley B Mail Merge £1
Sykes

This cartridge contains very handy utilities providing a mail merge and labeller for Quill files. Includes a demonstration.

37. P G Ives B The Double £4

A large strategy game in which you manage a football team through four league divisions; features buying and selling, team line-up, morale, and so on, through the league and F.A. Cup season. Includes full instructions.

EXCHANGE

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SOFTWARE

KEY	B = SuperBasic	A + B + O = Assembler and Basic Loader and Object Code
	A + O = Assembler and Object Code	S = Supercharged
	M + B = machine code and Basic Loader	L = QLiberate

38. Leslie B Education £2
Fahidy

As part of our series of educational programs, this is designed to help teach the solution of simple linear equations. It is aimed specifically at the 11-plus age range.

39. J F S Design 3D £4
Tydeman

A large suite of graphics and filing utilities for the production of 2D and 3D graphics, with instructions in the form of a Quill document. *QL World*, March 1987.

40. Santiago B Roulette £3
Rubio

A Spanish/English version of the traditional gambling game; includes the Leigh Pattern, a system to break the bank. *QL World*, September 1987.

41. Leslie B Money £2
Fahidy

An educational shopping expedition, calculating prices from shopping lists and trying to determine what coins you will receive as change.

42. Neil A + B + O Life £2
Davidson

A machine code version of the classic simulation of a colony of living cells which survive, reproduce or die according to mathematical rules. Quill instructions included.

43. Alan S Ian Swinton £2
Glassbrook Qsquidge

An arcade hunt through an 8x8 grid expandable series of rooms for the nine parts of Squidge's rocket. *QL World*, October 1987.

44. David March B Compress £2

Utility to compress SuperBasic program files into a more compact form without losing the structure of the program.

45. Ronnie M + B SuperBreakout £2
Davidson

A fast machine code version of the classic wall game where, using a bat and ball, you must try to break through the wall of bricks. Optional double bats and/or balls.

46. Norman B Navigator £2
Marks

To calculate the distance and direction for travel between longitude and latitude positions on the Earth. The program includes an expandable list of locations. The calculation formulae can be seen from within the program.

47. Richard B 3D Maze £2
Clements

Chase round the generated maze, shown in three dimensions, searching for the key to the next level before going through the exit. Extra points can be gained by passing over Point Squares but do not be carried away because it is all against the clock.

48. Jason B Yahtzee £2
Price

The popular dice game. On-screen graphics make the two-player program enjoyable and easy to use. *QL World*, November 1987.

50 Jay B Bank £4
Lewington

A menu-driven program to keep track of a number of bank accounts, including credits and debits, dated standing orders, printed statements and more.

51. A Didcock B Perspective £1

Space is big. This program aims to prove it, with a graphical guided tour of the earth, the solar system, neighbouring suns, galaxy and the whole of creation.

52. Simon M + B Space Pods £3
Quinn

A machine code arcade game. Your lone ship must protect six central energy pods against marauding aliens. *QL World*, December 1987.

THE ALL-NEW MICRODRIVE EXCHANGE

Microdrive Exchange has always been a popular feature of *Sinclair QL World* and in our constant efforts to improve the magazine we are expanding the Exchange to bring you even more quality programs at budget prices.

To achieve those results we have altered the format of the Exchange. Rather than calculating the number of sectors required by each program and sending the appropriate number of cartridges, we have now made it a one-program, one-cartridge system. So if you would like, say four programs, then regardless of length you will need four cartridges.

There are a number of advantages to the system. First, the service will be much faster, because programs can be copied in advance. Second, rather than having to ensure having the article for documentation we will be able to supply Quill documents on the Microdrive, if needed for future programs.

Finally, for all new programs on the Exchange, rather than just receiving the machine code version, the Supercharged version or whatever, we will be able to supply assembly listings, hex loaders and original Super Basic versions on the same cartridge, so that you can look at and amend programs.

Naturally this service will require the transfer of more than the usual number of Microdrives but bear in mind that the number of Microdrives you send will be returned with the software. We have reduced the price of Microdrives to £2 per cartridge.

With the new system, we have started to include programs which have not necessarily been featured in the magazine, either because they were too long or because we already had too many listings. Consequently we are now looking for quality programs of any length to feature in Microdrive Exchange. If you have any programs which you feel are good enough please send them for review.

See over page for order form

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1. POINTER'S TOOLKIT

Pointer's Toolkit is intended to be a complementary toolkit for QJUMP's Super Toolkit II and/or QRAM or for Sandy's SuperQBoard with mouse. Naturally you can use it also without any of this hard software. It contains a background string-exchange command, for example, a command to kill all currently running jobs, a function which works like INPUT, but you may give a pre-defined text to edit (like the input used by PSION), a new RESPR which never returns not complete, even if there are jobs running, a monitor-save-job, and, if you have a command called POINTER or a file called PTR-IMI or PTR-KBD (from QRAM), there are commands which give you access to the pointer and real pull-down-windows from SuperBASIC!

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Writer's Toolkit gives you new fonts (no normal QL Fonts), which you can use to write anywhere to the screen (with the new command WRITE). The new fonts include Old English, Antiqua, Helvetica, (and more) in different sizes. Fonts with a height of 8, 12, 16, 20, 24, 32 etc. are also possible. Now you can forget the ugly CSIZE 3, 1 QL fonts; Writer's Toolkit gives you beautiful fonts which you can use for example to make overlays for disk-labels. All fonts are defined as proportional, so Writer's Toolkit gives you not only nice looking fonts but also a nice face.

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3. DOT SCIENCE + SCREENCOPY

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2	QL-Bus	£96	DM298,-	
3	Dot Science Screencopy	£29	DM89,-	

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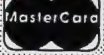


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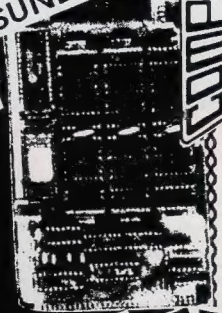


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